Croplife®

A BUSINESSPAPER FOR THE FARM CHEMICAL INDUSTRY

MEMBER, BUSINESS PUBLICATIONS AUDIT

BPA

A Miller Publication
Business Journalists Since 1873

Vol. 8 MAY, 1961 No. 5

NEW AMMONIA BARGE—One of a pair of new refrigerated barges operated by Phillips Petroleum Co. unloads at East St. Louis, Ill., terminal after completing its first trip from the company's terminal plant near Houston, Texas. This barge and another one like it are said to be the first large-volume vessels suitable for carrying agricultural ammonia in a refrigerated condition. Story and details on page 48, this issue.

News Briefs . . .

Complete Stories Inside

NPFI ANNOUNCES PROGRAM plans for annual June convention. Meeting dates June 11-14 at Greenbrier Hotel..page 2

ARMOUR AND PITTSBURGH firm plan pilot plant and test wells for new potash venture in Canada .....page 2

CORN BORER LOSS estimated at $96 million during 1960. USDA says insects caused loss of 103 million bushels ....page 2

NIAGARA CHEMICAL division operating new pesticide formulation plant at Dothan, Ala., for production of insecticidal products used in area .....page 17

CALIFORNIA FERTILIZER conference hears discussions on nitrogen and micronutrients in the soil .....page 24

GROUND BREAKING ceremonies held recently for new nitrogen facility of Armour Agricultural Chemical Co. at Cherokee, Ala. Plant will make ammonia, urea, nitrogen solutions, nitric acid, ammonium nitrate and ammonium phosphate .....page 44

PYRETHRUM production in Kenya Colony of Africa expected to be stepped up to more than 14,000 tons a year....page 47

W. R. GRACE TO BUILD new ammonia plant at Big Spring, Texas. Facility will produce 60,000 tons a year .....page 42

Progress Evident . . .

Review of Fertilizer Solutions for 1960 Shows Increased Facilities and Wider Use

By J. Richard Adams

Agricultural Research Service
U.S. Department of Agriculture
Beltsville, Md.

NITROGEN SOLUTIONS marketed in 1960 may be classified as pressure and nonpressure types with further classification of the pressure type into high- and low-pressure groups. The pressure types are essentially solutions of ammonium nitrate, urea or both ammonium nitrate and urea in aqua ammonia. The principal use of such solutions is in the ammoniation of superphosphate or of mixtures containing superphosphate. Some of the low-pressure solutions are used for direct application to the soil. The nonpressure types are aqueous solutions of nitrogen compounds other than ammonia and are used almost exclusively as direct-application materials.

Anhydrous ammonia, aqua ammonia and liquid mixed fertilizers are not considered in the present discussion.

The large and varied number of nitrogen solutions made a simple, flexible system of nomenclature desirable. Such a system was devised in 1958[1] and is being used now by many producers. The code consists of the company trade name followed by the percentage of nitrogen with the decimal point omitted and this, in turn, is followed by the composition in brackets. The composition is expressed as the percentage, rounded to the nearest whole number, of each source of nitrogen given in the following sequence: ammonia, ammonium nitrate, and urea. Any other

Turn to **SOLUTIONS** page 22

Features Inside

High Output Nitrogen Plant 8
Fertilizer Supplies Up in '61 11
Greater Use of Chemicals on Farm 14
By H. L. Haller
Prospects Bright for 1960's 16
By O. V. Tracy
What's New 18
Fertilizer Solutions Report 22
By J. Richard Adams
Personnel Notes 30
Industry Production Patents 34
Missouri Fertilizer Mixer 38
Editorials 50
Classified Advertising 51
Meeting Memos 51
Advertisers' Index 51

Accepted as a Controlled Circulation Publication Monthly by The Miller Publishing Co. P. O. Box 67, Minneapolis 40, Minn. Publication at Minneapolis, Minn.

Subscription Rates: $5 for 1 year; $8 for 2 Years Single copies 50¢

Freeman Heads Speakers at NPFI 1961 Annual Meeting

WASHINGTON — Orville L. Freeman, Secretary of Agriculture, will headline a group of speakers comprising economists, experiment station authorities, and fertilizer industry representatives at the annual convention of the National Plant Food Institute, June 11-14. The meeting will be conducted at the Greenbrier Hotel, White Sulphur Springs, W. Va.

Paul T. Truitt, NPFI president, will preside at the program sessions of both Monday and Tuesday, June 12-13, and the Institute's board of directors will convene Sunday evening, June 11 and also on Wednesday morning, June 14.

J. D. Stewart, Jr., Federal Chemical Co., Louisville, Ky., chairman of the NPFI board of directors, will welcome the convention group on Monday morning to mark the opening of the formal portion of the meeting. He will be followed on the program by Dr. Pierre Andre Rinfret, economist, vice president and director of the economics division of Lionel D. Edie & Co., Inc., New York. His topic will be "Economics of Tomorrow." Secretary Freeman follows him on the program.

Other features of the Monday morning program will be the presentation of Distinguished Service Citations to past presidents and past chairmen of the board of the institute and the organization's annual business meeting.

The program on Tuesday, June 13, will feature addresses by Willard M. Fifield, provost for agriculture, University of Florida, Gainesville, who will speak on "Coming Developments in Farming"; Henry L. Ahlgren, associate director, extension service, University of Wisconsin, Madison, whose subject is "The Future Role of Agricultural Extension," and another speaker to be announced later.

Scrolls will be presented by NPFI to winners in the "Soil Management Award for Editors" contest on Tuesday.

Committee chairmen for the 1961 convention are: Mrs. Gene Van Deren, Cynthiana, Ky., bridge and canasta party committee; Mrs. J. Fred Corkill of Los Angeles, Cal., ladies' golf and putting committee; W. R. Morgan, New York, men's golf committee; Tracy L. Adcock, Chicago, horseshoe pitching contest committee; Mr. and Mrs. W. B. Copeland, Little Rock, Ark., hospitality committee; Mrs. John W. Hall, Denver, Col., ladies' committee; L. Dudley George, Richmond, Va., memorial committee, and Dr. Richard B. Bahme, San Francisco, tennis committee.

Orville L. Freeman

Chemical Trade's Accident Rate on Decrease in 1960

WASHINGTON—A decrease in the frequency rate of industrial injuries in chemical manufacturing plants was recorded in 1960, as compared to 1959, according to a survey by the Manufacturing Chemists' Assn. covering 112 member chemical companies.

The frequency rate of injuries due to in-plant accidents declined from 3.38 per million man-hours worked in 1959 to 3.19 per million man-hours worked in 1960.

"This decline indicates a reversal of the unfavorable trend evidenced in 1959," General John E. Hull, president of MCA, stated. "Although the 1960 frequency rate is below that of 1959," Gen. Hull said, "it is still higher than the rates of the three previous years—1956-7-8. The rates for those years were 3.00, 3.01 and 2.98, respectively," he said.

In terms of severity rate of all injuries as measured in terms of calendar days lost per million man-hours of exposure, the industry also showed a decline from 617 in 1959 to 522 in 1960, the report states.

Credit for the decline in frequency during 1960, was due to intensified efforts on the part of chemical manufacturers to improve on-the-job safety practices, MCA says.

Armour Joins With Pittsburgh Firm In Potash Venture

Test Well Drilling Being Undertaken At Canadian Site

ATLANTA—Plans for a pilot plant and test wells for the solution mining of potash have been announced jointly by David G. Hill, president of Pittsburgh Plate Glass Co., and William Wood Prince, chairman of the board of Armour & Co.

The experimental unit will cost approximately $1 million. Following completion of successful pilot operations, a joint company to produce muriate of potash in a large multi-million dollar commercial plant located in Canada will be formed by Armour & Co. and Pittsburgh Plate Glass Co.

Drilling of test wells has already started on property 18 miles east of Moosejaw, Sask., Canada, to tap potash deposits underlying that area. In solution mining, water is pumped into the mineral deposit, the mineral is dissolved in water and then is recovered above ground from the solution.

Armour requires potash for use in fertilizers produced by the Armour Agricultural Chemical Co. Pittsburgh Plate Glass Co.'s chemical division has for a number of years mined common salt (sodium chloride) at depths as great as 6,800 ft. by the solution method. Common salt (sodium chloride) and the potash salt (potassium chloride) are closely related chemically.

This new method of recovering potash for fertilizer and other uses will compete with the existing rock mining process, the joint announcement said. To date, this method has been proven on a small pilot plant scale, and the operation of the Canadian pilot plant and test wells will give further information for the design of a large commercial installation.

USDA Estimates 1960 Corn Borer Losses At 103 Million Bushels Worth $96 Million

WASHINGTON — The European corn borer last year destroyed an estimated 102,991,000 bushels — more than 3 million tons—of corn worth $96,085,000, the U.S. Department of Agriculture has reported.

This loss, a composite of state and USDA estimates, nearly equals Wisconsin's entire 1960 crop of 105,718,000 bushels, and is about 2.6% of the total U.S. crop. The loss was 52% greater than in 1959, and is the fourth largest bushel loss in the past 10 years attributed to borers.

Greatest losses were in Iowa, Nebraska and Illinois. In Iowa, nearly 31 million bushels of corn grown for grain were destroyed; Nebraska lost almost 19 million bushels and Illinois 13 million bushels.

Estimates were made in 17 states, where the bulk of the nation's grain corn is grown, based largely on 1960 fall surveys of borer populations conducted by state entomological workers. Entomologists figure that each borer found in a plant cuts its production by 3%.

Borer numbers increased during 1960 but spread to only six previously uninfested counties. This foreign pest has made its home in the U.S. for more than 40 years.

Systox Approved for Additional Crop Uses

KANSAS CITY — Systox has been registered in the U.S. for use on apricots, plums and prunes to control aphids and mites, and on peppers to control aphids, it has been announced by its makers, Chemagro Corp., Kansas City, Mo. Systox was introduced in 1951 as the first systemic insecticide to be approved for use on food crops. The product has been used for insect control on a variety of vegetables, fruits, nuts, field crops and ornamentals.

Earns U.S.S. Promotion

PITTSBURGH, PA. — Charles W. Bourg has been named industry representative - agriculture, market development division of United States Steel, it was announced May 3 by Robert C. Myers, director of market development for the corporation.

Charles W. Bourg

Mr. Bourg has served as a market development representative in Salt Lake City since Jan. 1, 1956, when he joined United States Steel.

A native of Roseland, Neb., he is an Army veteran. He was graduated in 1949 from the University of Nebraska with a bachelor of science degree in agronomy, and served on the staff of the university as instructor in agronomy while earning a master of science degree in the same field. He received this degree in 1952.

PRESENCE OF WHITE-FRINGED BEETLE PROMPTS ADDED REGULATION

WASHINGTON—Additions have been made to the areas in eight southern states regulated against white-fringed beetles, the U.S. Department of Agriculture announced on May 8. This is the first time since 1957 that such additions have been necessary, USDA said.

Additions are being made in Alabama, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee. Added areas in all but the last three states include newly-infested counties.

At the same time, USDA is removing from regulated status one county in Tennessee, parts of three counties in North Carolina, one county in Florida, and one in Georgia. These changes became effective May 9.

White-fringed beetles seriously damage field and garden crops and ornamental plants, feeding on almost any kind of plant, USDA said in its bulletin. It added that most of the damage is done by the soil-inhabiting grubs feeding on roots.

Being removed from the regulated areas are all of Hamilton County, Tennessee; parts of Holmes County, Florida; Onslow, Pender and Wayne counties, in North Carolina; and Turner County, Georgia. Surveys for three years in these areas show them to be free of the beetles.

Newly-infested counties being added to the regulated areas for the first time comprise all of Dooly County, Georgia, plus parts of 20 counties in Alabama, Florida, Georgia, Louisiana and Mississippi.

Additions to existing regulated areas have been made in 66 counties—seven in Alabama, two in Florida, 29 in Georgia, six in Louisiana, 18 in Mississippi, two in North Carolina, one in South Carolina, and one in Tennessee.

New Mexico Increases Potash Production Tax

SANTA FE, N.M.—New Mexico's Gov. Edwin L. Mechem recently signed into law several changes in the severance tax statute which will increase slightly state taxes on potash production.

The severance tax rate on potash ore—that is, 2½% of the value of ore produced—remains the same, but the legislature decided to require potash companies to pay the tax on 80% of production value instead of 75%.

Also, deductions for hoisting, crushing and loading ore will be limited to 50%. In the past few years, some mining companies—notably uranium firms—have been taking deductions which the legislature regarded as excessive.

No estimate of the additional tax revenues has been made, but its effect on New Mexico's seven potash mining firms is expected to be slight.

New Pesticide Line

NEW YORK—Production and distribution of a new "Powco" brand line of specialty base products for non-agricultural use has been announced by Fairfield Chemicals, Food Machinery & Chemical Corp., supplier of basic chemical materials to formulators and manufacturers. Announcement of the new product line was made by George Kerbey, Fairfield Chemical's general manager, who said that the base products would be available nationally through Fairfield sales representatives.

Arab Potash Company Invites Services Bids

WASHINGTON—Proposals are invited by the Arab Potash Co., Ltd., Amman, Jordan, for supply of consulting engineering services, the Bureau of Foreign Commerce, U.S. Department of Commerce, reported on April 28.

The services are wanted in connection with an $18-million potash plant the Arab Potash Co. proposes to construct on the shores of the Dead Sea. Duties of the engineering firm will include preparation of plans and specifications, preparation of tender documents for construction of the project, analysis of tenders submitted, and supervision of construction of the project. Completion of the work is expected to require several years. Engineering firms selected will not be allowed to act as suppliers of equipment.

According to the Arab Potash Co., all proposals will be treated as confidential and will not be considered as price competition since selection of the consulting firm will be made solely on a professional basis.

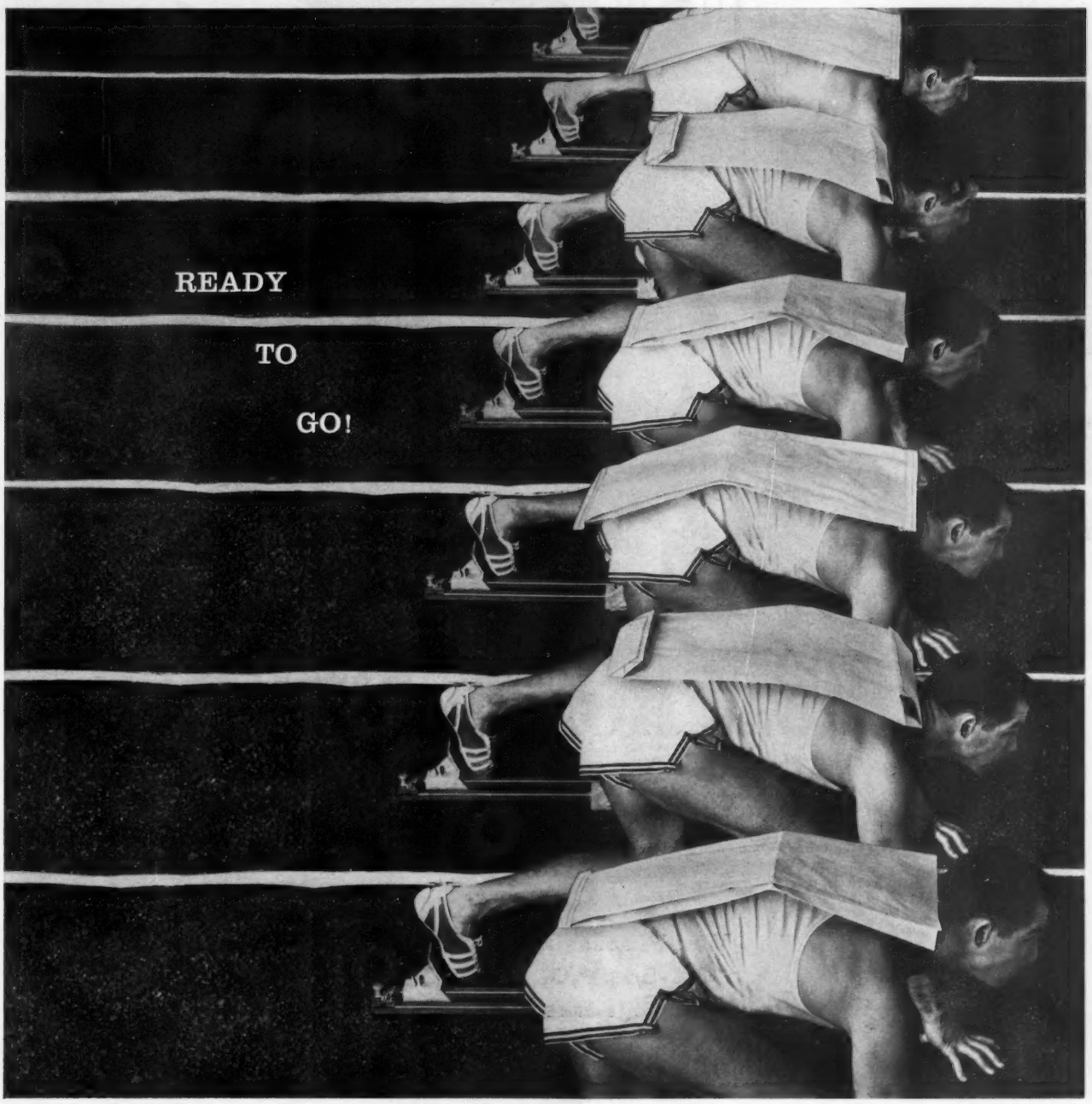
Proposals should be addressed to the Chairman of the Board, the Arab Potash Co., Ltd., Amman, Jordan, within 60 days and should include the following: remuneration required; complete background information about the firm, including the date of its establishment, professional records of the partners and/or members of the firm, number of technical personnel in various fields of engineering, total of projects in hand at present, description of previous potash projects completed by the firm with special emphasis on projects similar in nature and/or magnitude, etc.; general proposed program of work; time required for completion of each phase of the work.

Additional information is available on loan from BFC's Trade Development Division, U.S. Department of Commerce, Washington 25, D.C.

Canadian Lab Develops Improved Test Method

OTTAWA—In his first year of service with the Canada Department of Agriculture, Dr. J. Philipee Barrette put together a new system of analyzing pesticides which he says will introduce greater efficiency and accuracy.

A chemist in the Ottawa Analytical Control Laboratory of Plant Products Division, Dr. Barrette has adapted a chromatographic system for the quick separation of liquid or soluble compounds that formerly could be separated only by painstaking and time-consuming means.



13 St. Regis plants all set for speedy delivery

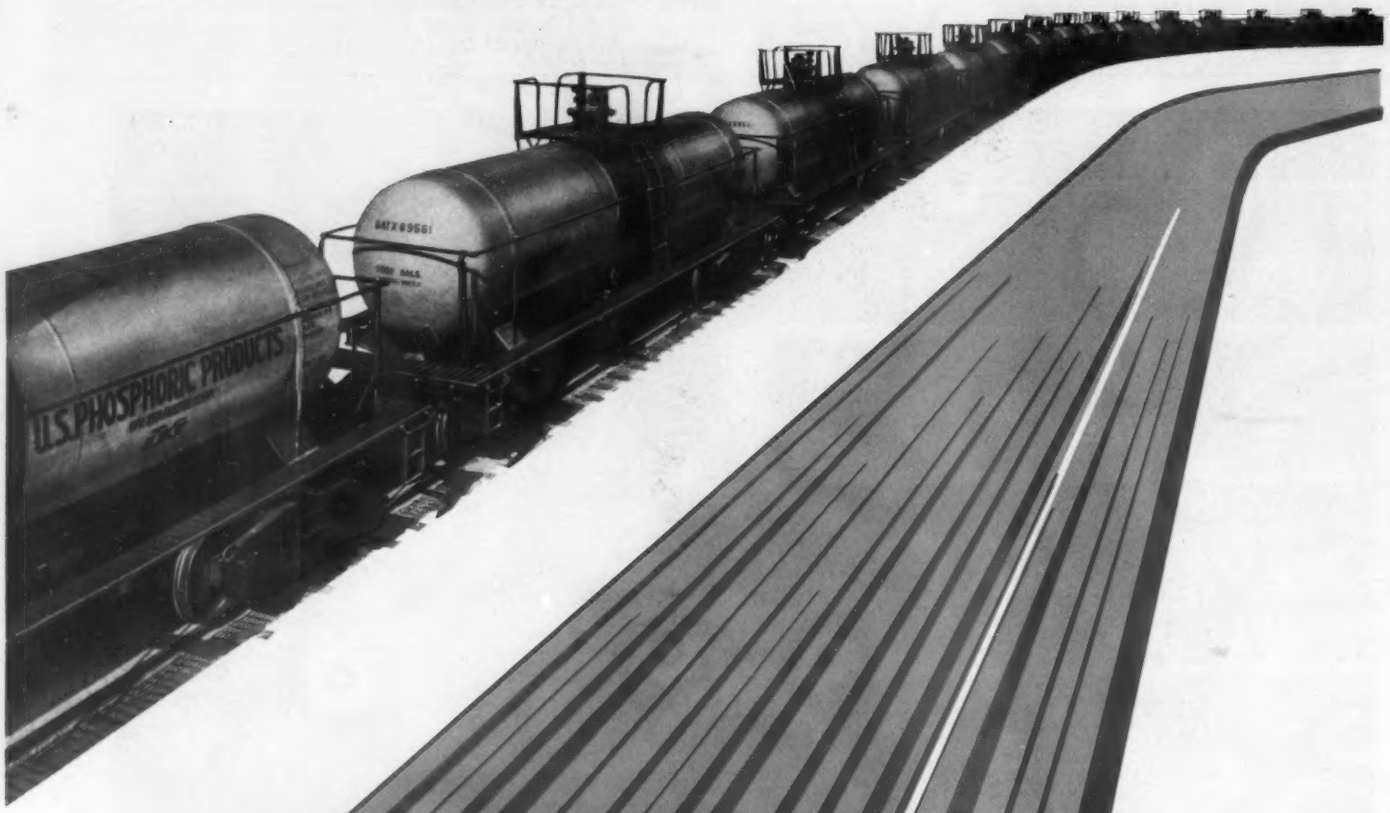
Whichever St. Regis® bag you want, whenever and wherever you want it, you'll get it... fast! St. Regis has 13 bag plants strategically located in the major fertilizer shipping areas to meet your national or local needs. Each can supply you with the complete line of bags and is fully equipped to give you swift, dependable service during peak-season rushes.

Fast delivery is only one part of St. Regis *Packaging-in-Depth*. This complete bag service assures you of the *right* bag, the *right* machinery to pack it, plus the services of a highly-skilled engineering staff. To meet your *future* needs, this program also includes continued research to develop improved packaging methods and economies.

PACKAGING-IN-DEPTH BY **St.Regis** BAG DIVISION

In Canada, contact St. Regis Consolidated Packaging Co., Ltd. PAPER COMPANY

USPP



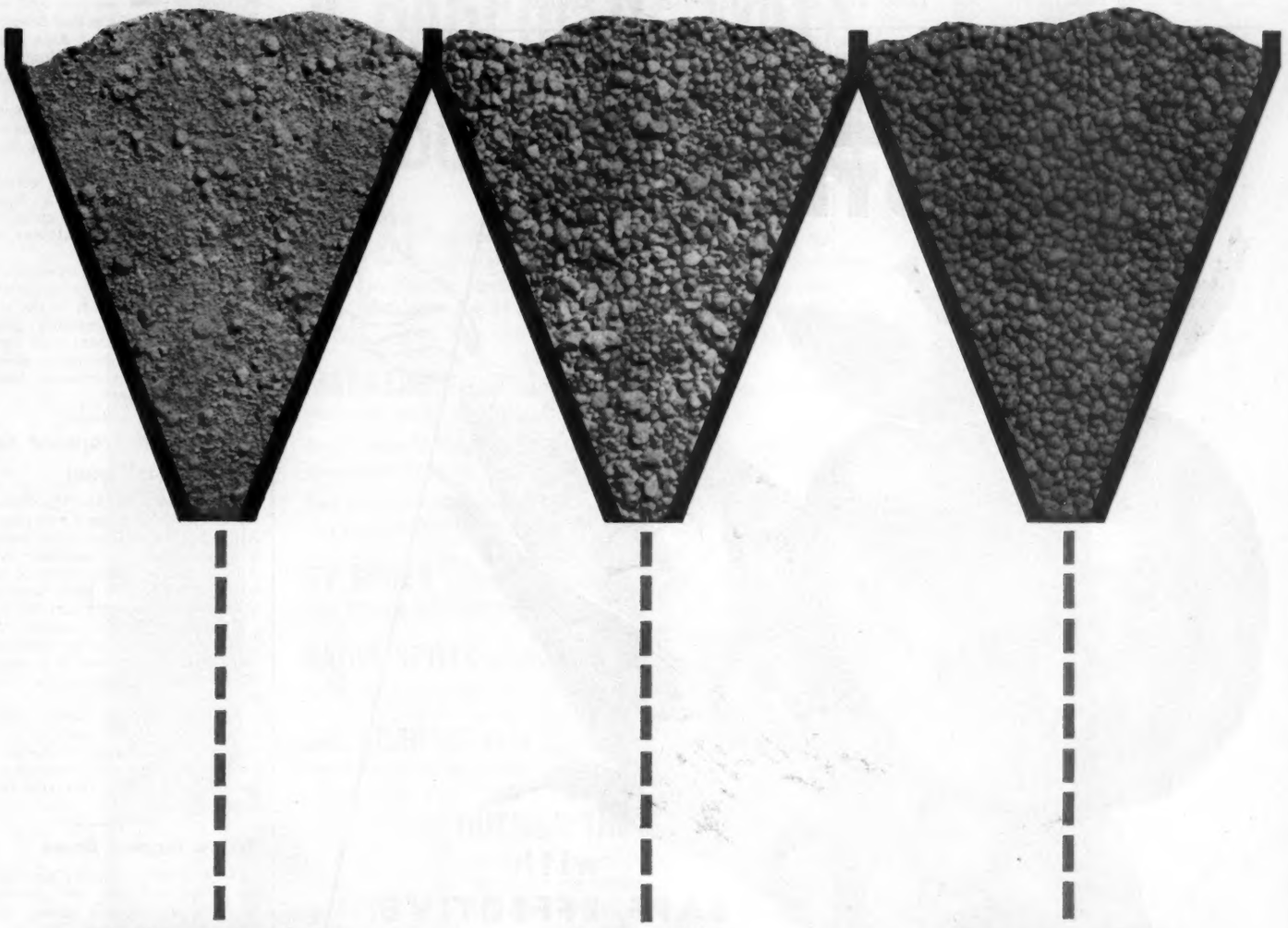
PHOSPHORIC ACID

Wet Process Acid of Highest Quality
52-54% P_2O_5
Solids less than 1% by weight

Headquarters For ALL Phosphates Used In High Analysis Fertilizers

USPP

TRIPLE SUPERPHOSPHATE



RUN-OF-PILE

COARSE

GRANULAR

For Requirements—Contact Our Sales Agents

BRADLEY & BAKER
155 East 44th Street,
New York 17, New York
Telephone: MUrrayhill 2-5325

U.S. PHOSPHORIC PRODUCTS
TAMPA, FLORIDA
Division
TENNESSEE CORPORATION

Boll Weevil Counts Show Winter Survival Differs in Various Cotton-Growing Areas

WASHINGTON—Boll weevils surviving hibernation are now more numerous in Tennessee and Mississippi, and in both the Coastal Plain and Piedmont areas of North and South Carolina, but less numerous in Louisiana, Texas, and south-central South Carolina than they were in the spring of 1960, the U.S. Department of Agriculture reports.

Each spring, entomologists of cotton-growing states and USDA's Agricultural Research Service estimate the number of weevils that have survived the winter to get an indication of the potential weevil population which will enter young cotton fields.

These estimates are made by examining trash in woods adjacent to last year's cotton fields, where weevils spend the winter in hibernation. Regardless of the number surviving the winter, weather conditions during late spring and early summer largely determine the extent of weevil damage to the crop. Hot, dry weather is unfavorable for boll weevil development and multiplication.

In McNairy County, Tennessee, an average of 1,815 weevils per acre of trash was counted—the highest carryover in the state since 1953—compared with an average of 807 weevils per acre in the spring in 1960. In the Piedmont area of North and South Carolina, an average of 1,558 weevils per acre was indicated, compared with 590 last spring. In the Coastal Plain of the Carolinas, the average was 1,129 this year, compared with last year's average of 1,049. The average in north central North Carolina rose slightly this spring, also—from 377 in 1960 to 430 this year. In Mississippi (the lower delta, central delta, north delta, and hill sections) the average count this year was 1,247 weevils per acre, up from last year's average of 821.

The largest per-acre survival was found in three northeastern Louisiana parishes—2,193 weevils. This was considerably lower than the 1960 average of 4,748, however. The average in Texas (Falls, Hill, Limestone, and McLennan Counties) was 1,516, compared with 2,065 in 1960. The average in south central South Carolina dipped from 861 in 1960 to 376 this spring.

$200,000 FIRE IN ILLINOIS

AURORA, ILL.—Fire destroyed the Moody Seed & Fertilizer Co. near here April 30. Loss was estimated at $200,000.

Penick's RYANIA effectively controls European Corn Borer and Codling Moth. Early applications nip infestations at the outset, and periodic use throughout the season provides continued protection that increases crop yields.

As a safe, botanical pesticide, RYANIA does not harm fruit and may be applied right up to harvest without fear of harmful residues.

RYANIA may be sprayed or dusted. It's available as time-tested RYANICIDE® 100 or new RYANICIDE® 50 W.P. For complete information, write Penick today.

PENICK

Farm Chemical & Insecticide Division

S. B. PENICK & COMPANY • 4161 BECK AVENUE, ST. LOUIS 16, MISSOURI

NEW YORK • CHICAGO • LOS ANGELES • SAN FRANCISCO • PORTLAND, ORE.

GRASSHOPPERS!

WINNIPEG, MAN.—The worst infestation of grasshoppers in 10 years is predicted for large areas of Alberta, Saskatchewan and Manitoba this summer. If predicted drouth conditions occur, grasshopper damage can be extensive in many of the regions now known to be heavily invested with eggs. Department of Agriculture officials are urging farmers to take every precaution to control these pests by spray methods and other means.

Two Scientific Societies Adopt Elemental Terms

MADISON, WIS.—The elemental method of expressing fertilizer nutrients, including minor elements, will be used in the research and educational journals of the Soil Science Society of America and American Society of Agronomy, beginning with the January, 1962, issues, the groups have announced.

Authors will be permitted, however, to include the oxide expressions such as P_2O_5 or K_2O along with the elemental analyses.

The society publications include the research journals "SSSA Proceedings" and "Agronomy Journal," and the popular-style educational magazine "Crops and Soils."

The SSSA and ASA executive committees say, "This move toward practicing what we preach in the society research and educational journals should be a significant step forward in our efforts to encourage universal acceptance of the elemental basis for labeling fertilizers."

Amendment Proposed to Permit Low Flying

SAN FRANCISCO—The Montana, Idaho and California Agricultural Aircraft Associations have endorsed a proposal formally to include in Civil Air Regulations the waiver under which crop dusters have been flying at less than the minimum 500 feet.

Chairman Norman Larson of the California Aeronautics Commission submitted the proposal in a report to the Federal Aeronautics Administrator.

Agricultural applicators said the waiver has been a handicap in dealing with insurance companies and banks. Mr. Larson's proposal is expected to alleviate this situation, if accepted.

Witco Income Down

NEW YORK—Witco Chemical Co., Inc., has reported net income of $597,200, or 39¢ per share, for the first three months of 1961, as compared with $740,100, or 49¢ per share, for the comparable period the previous year. However, sales and other income for the three months ended March 31, 1961, were $24,429,700, as compared with $23,794,200 for the same period in 1960.

John H. Kennedy Retires From Stauffer Chemical

NEW YORK—John H. Kennedy, one of the pioneers of the agricultural chemicals business, is retiring from his position of assistant to the vice president, agricultural chemicals division, Stauffer Chemical Co.

Mr. Kennedy has spent more than 45 years in industrial and agricultural chemical sales. He was Stauffer's eastern sales manager of agricultural chemicals for 20 years during which time the company's operations in this field expanded over 20 fold. He also served on the board of directors of the NAC Assn.

On retirement Mr. Kennedy plans to "actively relax" as Resident Manager of Zipse's East Lake Camp, Oakland, Maine.

A BAGFUL OF WAYS TO BOOST Hi-D® SALES

IN '61 The idea of Hi-D is catching on. More farmers, more ranchers, more growers are using ammonium nitrate in granular form—using Hi-D as a supplement to your mixed fertilizers. Read how CSC is spreading the news about Hi-D and backing up your own sales efforts throughout '61.

MAGAZINES feature these informative ads, explaining the many advantages of Hi-D.

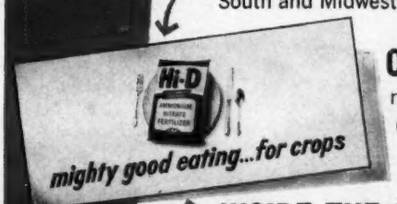
In full color in Progressive Farmer, Farm & Ranch and Successful Farming.

And in black and white in Florida Grower & Rancher, Prairie Farmer, Citrus & Vegetable Grower and Rice Journal.

TV SPOTS on farm programs of 18 stations demonstrate the free-flowing action of Hi-D.

RADIO SPOTS on 75 stations are a frequent nudge to farmer's memory.

BILLBOARDS in 879 high-traffic locations throughout South and Midwest enlarge 'Mighty Good Eating' theme.

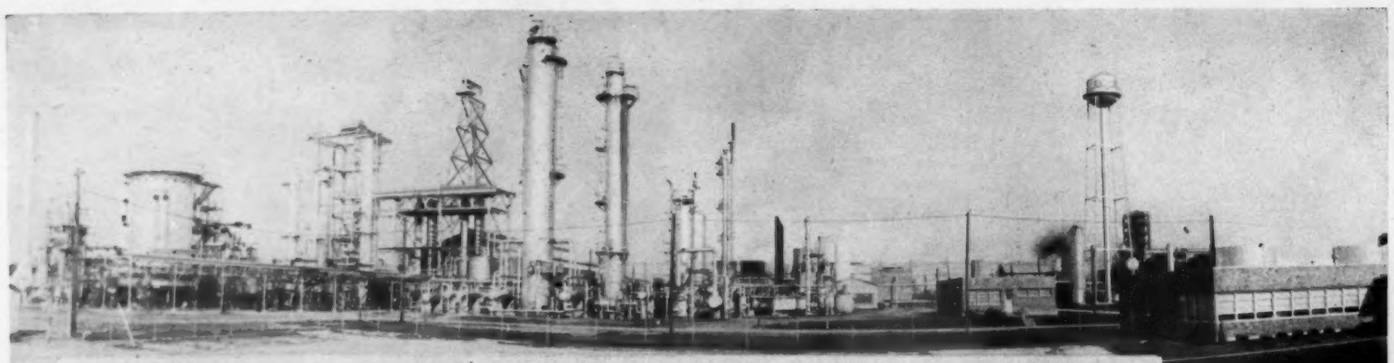


OUTSIDE THE STORE Attractive metal sign and Hi-D clock-type thermometer (attention guaranteed!) bring the Hi-D buyer to your store.

INSIDE THE STORE Window streamers echo theme of 'Mighty Good Eating'; packages of samples, product folder and counter displays keep customers thinking Hi-D.

CSC

COMMERCIAL SOLVENTS CORPORATION, AGRICULTURAL CHEMICALS DEPARTMENT, ATLANTIC HIGHLANDS, NEW JERSEY



Five Nitrogen Products . . .

High Output From Kansas Plant

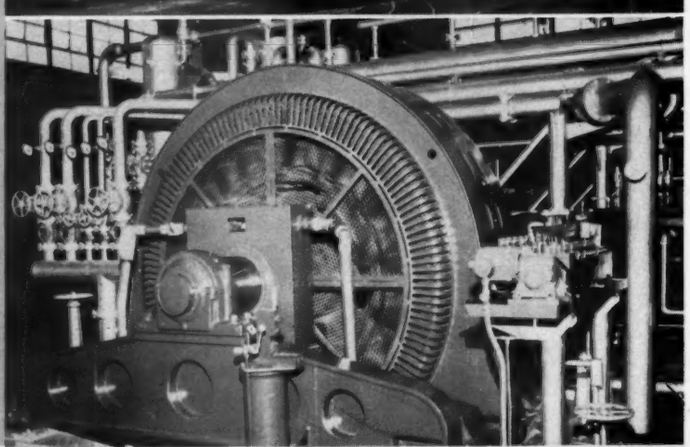
EFFICIENCY AND safety are watchwords at the Lawrence, Kansas, plant of Cooperative Farm Chemicals Assn. which turns out large daily quantities of ammonia, nitric acid, ammonium nitrate, urea and nitrogen solutions. The operation, representing an investment of over $25 million, is situated on a 374-acre site east of Lawrence, with main line rail facilities reaching all parts of the large area served by the plant.

Situated on land which only a few years ago was utilized for corn fields, the plant presently turns out some 132,000 tons anhydrous ammonia a year; 115,500 tons nitric acid; 10,500 tons nitrogen solutions; 75,800 tons urea-nitrate solutions; and 100,000 tons ammonium nitrate. To accomplish this production, the daily use of raw materials comprises 6,400 tons of air; 2 million gallons water; and 21 million cu. ft. natural gas each day.

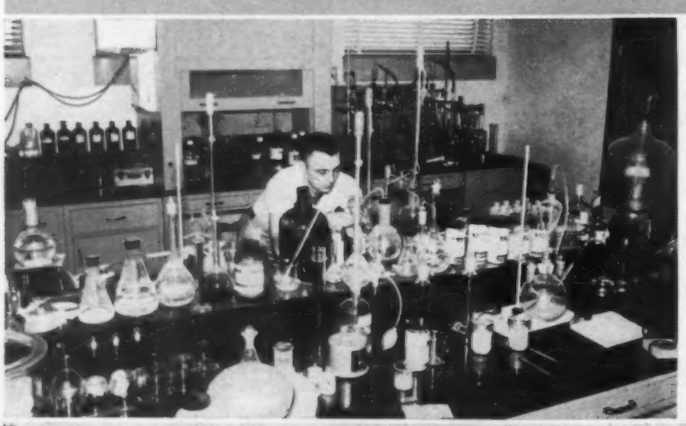
R. R. Zurbuchen, general manager, states that production is on a high level at the present time, with the plant consistently operating at rates considerably beyond rated capacity. Plans for expansion are also being made for the near future, he says.

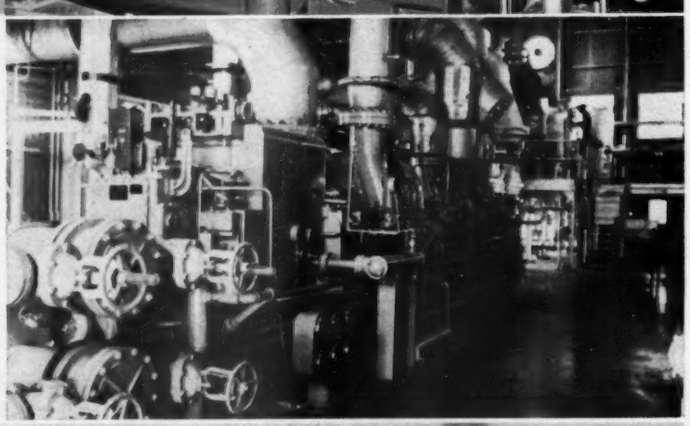
Some 2½ miles of railway track within the plant area are utilized for bringing in raw materials and for loading out finished goods in both bag and bulk. Use of railroad cars is also made to haul bagged products from the ammonium nitrate plant to the new 16,500-ton storage warehouse at the far end of the plant site. This warehouse, incidentally, is 800 ft. in length by 160 ft. wide. The track siding, paralleling one side of the storage area, enables loading and unloading of numerous cars simultaneously. The plant owns and operates its own diesel locomotive capable of pulling a string of 15 or more cars. A smaller gasoline-operated car mover is utilized for spotting cars and for switching in yard areas.

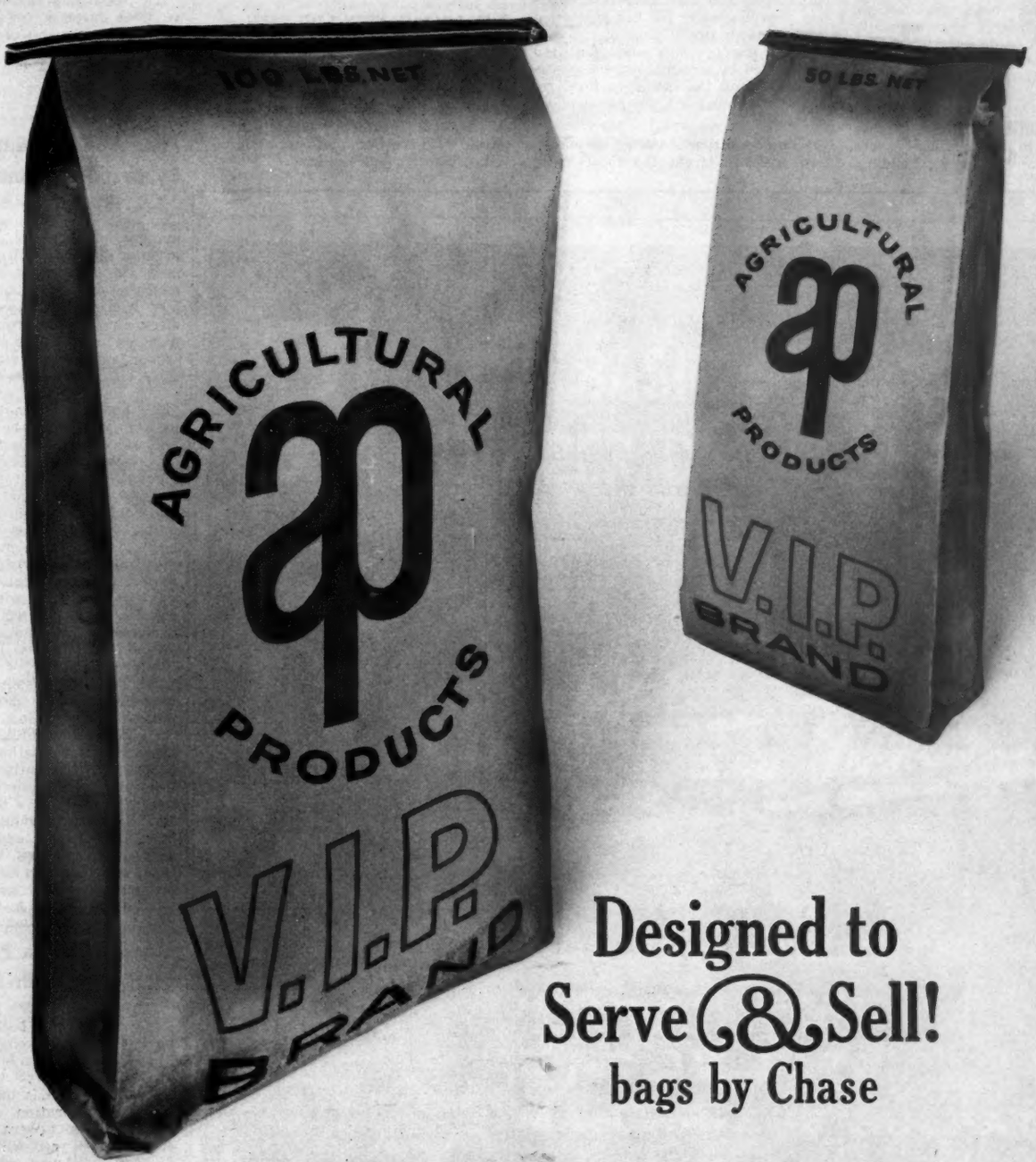
The ammonium nitrate area is separated from the rest of the plant, and its 200-ft. prilling tower is a landmark on the fairly flat



PLANT SCENES—Top of page, general view of CFCA nitrogen plant at Lawrence, Kansas. Towers are part of ammonia manufacturing section. Other pictures, clockwise, show ammonium nitrate prilling tower, with R. R. Zurbuchen, general manager, in inset; new 4400 h.p. electric motor for operating compressors; view of one compression unit in nitric acid plant; diesel locomotive pulls string of cars on part of plant's 2½ miles of track; and scene in plant's control laboratory where constant checks are maintained on product standards.







Designed to Serve & Sell!

bags by Chase

Your package is the "picture" of your product to your customers and prospects. To make the picture attractive Chase's Art Department is ready to help you design a brand to achieve just the right effect for your purpose. Skilled color printing craftsmen follow through to give you a bag that does a top selling job.

And to make your bag serve—longer and better—we insist on the finest bag materials available, bought in the open market and thus not limited to a single source. Our "kraftsmen" turn these into the toughest bags you ever put feed, seed, fertilizer, chemicals—or anything—into.

If you want bags that are designed to sell as well as made to serve, call your Chase Man. Or write us.

CHASE BAG COMPANY
355 Lexington Avenue · New York 17, N.Y.

*A Chase bag will make your product a Very Important Package.

MULTIWALLS • TEXTILE • PLASTIC AND LAMINATED BAGS • CONSUMER-SIZE PAPER BAGS AND OTHER PACKAGING MATERIALS

Kansas landscape. Capacity for production of ammonium nitrate is 400 tons a day. Much of the daily production is shipped out immediately during the busy season, but storage facilities are available for keeping on hand some 16,500 tons.

Nitric acid in the amount of about 350 tons a day (100% acid) is made at the Lawrence plant. The process consumes 100 tons of ammonia daily. The plant consists of three independent units, and the nitric acid product is stored in three 33,000-gal. stainless steel tanks.

The compressor building houses six engines and motors for ammonia manufacture. Two diesels are capable of producing 3,600 h.p. each, and each weighs about 100 tons. Four additional engines are rated at 2,000 h.p. each and their total weight is 200 tons.

Cooling facilities for these engines are included in the cooling towers adjacent to the compressor building. Some 75 million gallons of water a day are circulated through these towers. Water entering the towers at 106 degrees F. is cooled to 86 degrees and delivered by steam and electric-driven centrifugal pumps back to the various units. It returns to the cooling tower, still under pressure, in 30-inch lines.

The water treating plant is supplied from nine wells alongside the property. A storage tank of a million-gallon capacity is used to hold water from which unwanted minerals have been removed. An elevated water tank near the administration building provides water for fire protection and domestic use.

Most employees of the plant are unaffected by seasonal aspects of the business, and the employee level remains at around 280, the management says.

The operation is visited by many groups both from the local area and also from afar. During the first quarter of 1961, some 2,500 visitors had been escorted through the facilities.

Safety in all areas is stressed, and as a result, the plant has earned a very low accident frequency record.

Fertilizer products manufactured at the Lawrence, Kansas plant are distributed in a huge central area of the U.S., from the Canadian border south to the Texas line, and from western Utah to the Great Lakes region.

APPLICATION LICENSES

DENVER, COLO.—Gov. Steve McNichols has signed into law a measure to provide for the licensing and regulation of all commercial applications of agricultural chemicals and setting up an advisory committee to work with the Commissioner of Agriculture to enforce the law.

OHIO EXPECTS BIG SPITTLEBUG YEAR

WOOSTER, OHIO—Spittlebug will cause damage estimated at nearly $7 million to clover and alfalfa crops in 1961, according to Dr. Robert E. Treece, Ohio Agricultural Experiment Station entomologist, who reports that surveys estimating adult populations, showed that central and northeastern Ohio would be hit hardest this year.

The spittlebug has been a problem to Ohio farmers for the past ten years. In seriously infested areas, it has resulted in losses up to 25% or more of the crop. The pest removes plant juices.

Four Appointments Made By Best Fertilizers Co.

LATHROP, CAL.—Best Fertilizers Co., Lathrop, Cal., has announced a number of personnel changes in its organization. John A. Randolph has been appointed plant superintendent, fertilizer and warehouse section; Alfred Nielsen is now engineering adviser; Eric B. Biedermann, personnel manager; and Walter W. Ross, comptroller and special management adviser.

Mr. Randolph, 38, joined Best in 1955, and was promoted in 1958 to assistant fertilizer plant superintendent. He served with the U.S. Navy during World War II.

Mr. Nielsen is a graduate from the California State Polytechnic College and holds a degree in mechanical engineering. His duties with Best will be to devise and standardize the mechanics of applying and handling agricultural chemicals. He was formerly a consultant with Dow Chemical Co. for nematocide application problems and was an executive of the Joaquin Agricultural Equipment Co., Hanford, Cal.

Mr. Biedermann joined Best in 1960 as administrative assistant in construction affairs. He is a graduate of the University of California school of business administration, Berkeley.

Mr. Ross, a native of Scotland, lived abroad and in Canada before coming to Best as a new resident of the U.S. He is a graduate from Edinburgh University, and was for five years an accountant in England. He spent some years in Egypt as an auditor and later came to Toronto, Canada before coming to the U.S.

Hooker Names Pair to Marketing Positions

NEW YORK—W. Newell Wyatt, Lyndon, Ky., has been named manager, market development, of the Phosphorus Division of Hooker Chemical Corp. Prescott S. Olmsted, Lewiston, N.Y., succeeds him as manager, sales administration, of the division.

Appointments were effective May 15, and both men will be located at division headquarters in Jeffersonville, Ind., as announced by John B. Sutliffe, division sales manager.

U.S. Borax Representative

LOS ANGELES, CAL.—Barry A. Frazee has been appointed sales representative for United States Borax & Chemical Corp. in Texas, Oklahoma and New Mexico, according to an announcement by W. J. Dibble, director of marketing.

Barry A. Frazee

Before joining U. S. Borax, Mr. Frazee was an instructor in marketing, consumer economics, and advertising at the professional division of the College of William and Mary, Richmond, Va.

This familiar symbol represents the extra service behind . . .

SWIFT'S MINUTE MAN PHOSPHATES

Phosphate Rock—
Ground and Unground
Triple Superphosphate

The people at Swift's modern Phosphate Center are anxious to serve you. These are friendly, cooperative people who not only know phosphates but know the importance of good service to you.

For example, Swift's Phosphate Center includes a Customer Service facility where, through the magic of a modern, precise control system, you can get accurate, up-to-the-minute information on cars shipped, car numbers, dates and routing. Like the Minute Man, a minute's notice is all that is needed to put the system into action.

You'll enjoy doing business with Swift's Phosphate Center . . . with dedicated people who want to serve you. Have a Swift Phosphate Center Representative outline the advantages Swift's service offers you in phosphates—triple, phosphate rock or ground phosphate rock.

Swift PHOSPHATE CENTER

THE SERVICE CENTER FOR ALL YOUR PHOSPHATE NEEDS

SWIFT & COMPANY
Phosphate Center • Bartow, Florida

P-8

108th Year

To Serve Your Industry Better WITH MINUTE MAN PHOSPHATE ROCK, GROUND PHOSPHATE ROCK AND TRIPLE SUPERPHOSPHATE

But Watch Government Programs . . .

Fertilizer Supplies for Year Up 4%, USDA Survey Indicates

WASHINGTON—Supplies of fertilizers for the 1960-61 fertilizer year (July 1 through June 30) are expected to total 8,293,000 tons of plant nutrients, to mark a gain of 4% over the 1959-60 year, according to a report of agricultural chemicals staff of the commodity stabilization service, U.S. Department of Agriculture. In charge of the project was Harold H. Shepard, assisted by John N. Mahan, fertilizer specialist and Charlotte A. Graham, administrative assistant.

According to the report, the gain in tonnage reflects optimism on the part of the fertilizer industry when activity is at a reduced level in many other sectors of the economy.

The compilers state that estimates made in the report are based on stock trends, rates of production and foreign trade during the first six months of the fertilizer year in relation to the same period in other years.

The compilers also note that a tight supply situation might develop during the current season, if the estimates turn out to be as realistic as they appear to be. "Production schedules usually are not flexible enough to meet a sudden upsurge in fertilizer shipments," the report observes, and adds that changes in agricultural legislation or programs could have an effect on trends in the industry.

Here is the way the situation is presented by Mr. Shepard, Mr. Mahan and Miss Graham:

Nitrogen

Supplies of nitrogen fertilizer for the 1960-61 year are expected to total 2,964 000 tons N, up 4% over the record 1959-60 supply (Table 1).

Production of anhydrous ammonia and fertilizer grade ammonium nitrate solution is again at record levels. Separately, in combination, or one or both supplemented with urea, these constitute about 60% of the total domestic supply. A 6% larger supply of anhydrous ammonia for direct application and use in mixed fertilizers is expected to be available this year.

Exports of ammonia are expected to increase 40% over 1959-60. The supply of nitrogen solutions will rise nearly 4%, with imports expected to double. (Some increase in exports of solutions is included in the figure for "all other" nitrogen.)

About 5% more solid ammonium nitrate will be available than a year ago due to increases in production and imports, and further curtailment of exports.

Ammonium sulfate production was down about 69,000 tons N content in 1959-60 from the previous year due to the steel strike and decreased synthetic production. Yet June 30, 1960, inventories of primary producers totaled 195,736 tons of material against 72,342 tons at the previous year's end.

In the current year, by-product ammonium sulfate production is lagging behind normal levels because of reduced output of the steel industry's cokeovens, while producers of synthetic are operating only at about the same level as last year. Production plus stocks, however, should provide about a 3% increase in domestic material.

Indications are that ammonium sulfate of exact specifications as to granule size, etc., is in tight supply. This may reduce the competitive position of other ammonium sulfate because imports in the first half of the year lagged and exports were about the same. These circumstances may encourage shifts to other forms of nitrogen.

Urea production was down about 1% during the first half of the year but is expected to pick up during the second half. Imports were up about 50%; however, it is estimated that less than 40% of imported urea goes for fertilizer even though it is im-

Turn to **FERTILIZERS** page 40

TABLE 1—Nitrogen: Estimated Supply of Nitrogen for Fertilizer Purposes, 1959-60 and 1960-61, U.S. and Possessions
(1,000 short tons of N)

Item	1959-60*	1960-61
Supply from domestic sources:		
Solids:		
Ammonium nitrate†	433	456
Ammonium sulfate†	294	303
Urea	110	120
All other solids	256	302
Total solids	1,093	1,181
Liquids:		
Ammonia (incl. aqua)	841	891
All other	809	837
Total liquids	1,650	1,728
Total (solids and liquids)	2,743	2,909
Imports:		
Ammonium nitrate	52	73
Ammonium sulfate	54	32
Urea†	12	18
Ammonium nitrate-limestone mixtures	26	20
Sodium nitrate	73	70
Nitrogen solutions	6	12
All other	75	65
Total	298	290
Exports:		
Ammonium nitrate	21	8
Ammonium sulfate	51	49
Urea	16	32
Ammonia (incl. aqua)	66	92
All other	34	54
Total	188	235
Net domestic supply	2,853	2,964

*Revised.
†Adjusted for estimated quantity going into non-fertilizer uses.

ONE BASIC SOURCE
FOR FERTILIZER CHEMICALS

Reminder
Order from Tennessee

COPPER SULFATE
IRON SULFATE
ZINC SULFATE
MANGANESE SULFATE
MANGANOUS OXIDE
MINERAL MIXTURES

GET THESE PLUS FACTORS—

Cut cost with combined carload lots from One Basic Source — Save time, plant space and labor by using our Custom Formulated Mixtures—We will furnish you combinations of minerals mixed to your particular specifications.

Foliar Nutritional Products—

Iron, Zinc and Manganese Compounds—Nu-Iron, Nu-Z, Nu-Manese and Es-Min-El (a foliar applied mineral mixture).

For further information, phone, wire or write—

TC TENNESSEE CORPORATION
612-629 GRANT BUILDING, ATLANTA 3, GEORGIA

These services (and more)

IMC TOTAL

Why limit your total opportunity

Many of the fertilizer industry's most successful manufacturers rely on IMC as a single source for their full line of raw materials* and total service.

IMC interests itself in every phase of your marketing operation . . . does something positive about it. Total Service embraces marketing assistance, sales

MARKET ANALYSIS HELP | MANAGEMENT HELP | SALES, DEALER, FARMER MEETING ASSISTANCE | ADVERTISING PROMOTION HELP | TECHNICAL SERVICES

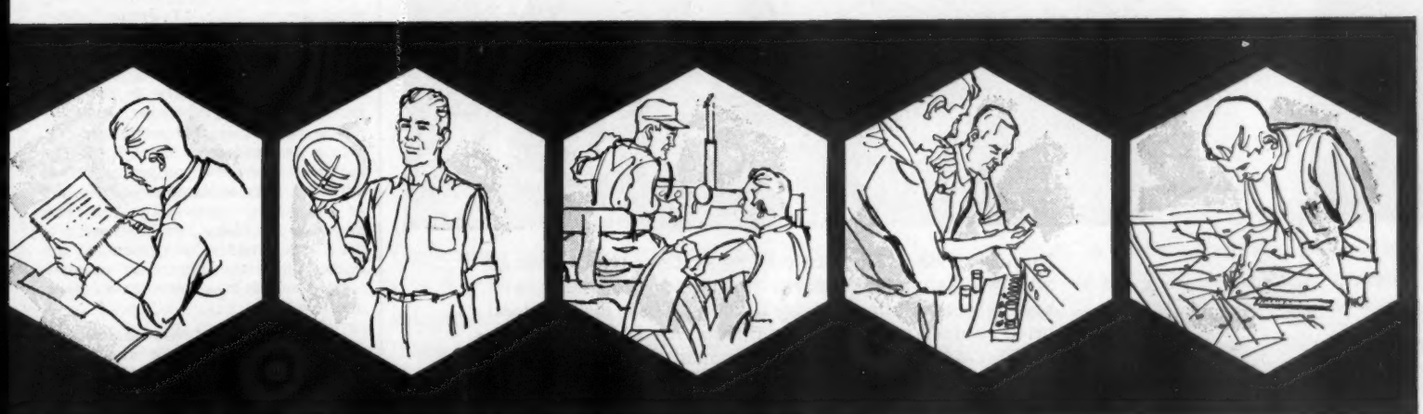
MOST COMPLETE LINE OF FERTILIZER MATERIALS

Phosphate Rock • Calcined Phosphate Rock • Triple Superphosphate (Run-of-pile, Coarse, Granular) Phosphoric Acid • Muriate of Potash (Standard, Coarse, Granular) • Sulphate of Potash • Sul-Po-Mag®

are yours with SERVICE! with anything less?

services, management help, technical service, year-round planning, transportation, insurance, safety, and credit and collection assistance.

Why limit your potential . . . take advantage of IMC's Total Service for your fullest profit opportunity. Join forces with IMC!



YEAR-ROUND SALES PLANNING | INSURANCE AND SAFETY | CREDIT AND COLLECTION ASSISTANCE | SALESMEN TRAINING PROGRAMS | TRANSPORTATION SERVICES

AGRICULTURAL CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

ADMINISTRATIVE CENTER, OLD ORCHARD ROAD, SKOKIE, ILLINOIS,

IMC

PRODUCTS FOR GROWTH*

*TRADEMARK

FO-5-01

"Chemicals Are Here to Stay . . ."

Entomologist Sees Greater Use of Chemicals in Farming

By Dr. H. L. Haller*
Assistant to Administrator, Farm Research
Agricultural Research Administration, USDA
Washington, D.C.

THESE ARE times when serious questions are being raised about chemicals in agriculture. It seems appropriate, therefore, to focus attention upon the use of pest control products on cotton, and to look ahead to the prospective situation.

Everyone knows that the use of chemicals in agriculture is far from being a new type of activity. Sulfur was used to control insects as early as 2,000 B.C. Farmers in the early years of American agriculture got along fairly well with very few chemical products at their disposal.

However, with the development of new crops and the intensification of agricultural practices, insect populations have increased and have become more difficult to control. Cotton growers, for instance, are especially aware of the difficulty of controlling the boll weevil, the bollworm and other cotton insect pests.

With the research knowledge gained to meet the needs of World War II came new and improved agricultural chemicals. Today, many different kinds of new and improved chemicals are used in all phases of agriculture. The use of insecticides, herbicides, fungicides and other chemicals has become accepted practice on nearly all cotton farms. In fact, the benefits from these chemicals helped our agriculture probably more than any other segment of our civilization and economy.

As with all progress, however, the use of pesticides does not provide an unmixed blessing. Many of the new pesticides are also poisonous to man; some of them also leave residues; that in part, is why they are good. But this does not necessarily mean that injury will result to man and his domestic animals when pesticides are used in the quantity and in the manner recommended. An important question that needs to be considered is the extent of the hazards presented by pesticides.

In the U.S. the score or so of accidents attributed to pesticides are statistically insignificant when compared to the four million home accidents causing approximately 28,000 deaths annually. But this does not mean that pesticide users can be complacent—precautions must be observed.

The proper and safe use of agricultural chemicals is of deep concern to us in the Department of Agriculture. This concern begins with the research man who studies a chemical's usefulness, and it extends through to the time the chemical becomes an instrument for farm production.

We are constantly pressing for more effective and safer pest controls. We seek to provide the widest possible margin of safety to consumers of agricultural commodities, to fish and wildlife, and to other national resources in areas subjected to treatment. This is our goal whether chemicals are applied by farmers individually, or as part of a state-federal cooperative program. At times it becomes necessary, in making recommendations, to weigh benefits against possible adverse effects.

Why then are some people questioning the use of agricultural chemicals in our production of cotton and of food? Just what are our problems and what is the U.S. Department of Agriculture doing about them?

There is no simple answer to these questions. But we can look at the broad picture, and then break it down into its component parts.

Let's start from the beginning:

In creating the Department of Agriculture in 1862, Congress defined in broad terms the functions to be performed—"to acquire and diffuse useful information on subjects connected with agriculture in the most general and comprehensive sense."

The acquisition of useful information is accomplished through the Department's research program. This is aimed at developing knowledge, first, to find prompt answers to the more pressing problems, and second, to provide a broader background of understanding—through basic research—from which more lasting solutions may evolve.

The diffusion of new knowledge is through Department and State Experiment Station publications, and the Agricultural Extension Service.

As time has passed, Congress has given the Department many new functions and responsibilities, other than research and education.

As new chemicals are introduced into farming operations, consumers must have assurance that these toxicants are used intelligently, and that harmful residues will not remain on food reaching the market. The problem is to derive the full benefit from chemicals without harm to anyone. And that brings us to the matter of regulations.

In fulfilling its responsibilities to the consumer, the Department of Agriculture is responsible for administering a number of regulatory programs dealing directly with the pro-

*From address made before 1961 Beltwide Cotton Production & Mechanization Conference, Greenville, S.C.

EHRSAM for continuous LOADABILITY!

Engineers who specify conveying systems today demand quality – equipment proven to speed processing and maintain continuous material flow. They look beyond price to design and craftsmanship. An Ehrsam bucket elevator adapts to existing equipment for easy installation. Dramatically increases productivity. Ehrsam frees you from critical design and fabrication costs and bears the responsibility for efficient operation throughout its useful life. Behind quality is management's "no-orphan" policy . . . Ehrsam refuses to abandon one piece of equipment in productive use. Ehrsam supplies a wide range of products to fit your material flow pattern . . . at your desired pace . . . for increased profits. Call one of the seven district offices below for complete information.

The J. B. EHRSAM & SONS MANUFACTURING CO.
ENTERPRISE, KANSAS

DISTRICT OFFICES | Kansas City, Kans. / Denver, Colo. / Chicago, Ill. / Fort Worth, Texas / San Francisco, Calif. / Phoenix, Ariz. / Hastings, Neb.

EI 2-461

duction, processing, and marketing of agricultural products.

These are:

1. The Meat Inspection Act of 1906, which assures consumers a supply of safe and wholesome meat and meat food products.

2. The Agricultural Marketing Act of 1946 which provides—in addition to research and marketing programs—certain standards in the marketing of agricultural products.

3. The Federal Insecticide, Fungicide, and Rodenticide Act of 1947. (A revision of the Insecticide Act of 1910.)

4. The Poultry Products Inspection Act of 1957, which provides protection for poultry products similar to those of the other meat products.

5. Public Law 86-319 of 1959, which extends coverage of the Federal Insecticide, Fungicide, and Rodenticide Act to include nematocides, defoliants, desiccants, and plant growth regulators.

In addition to these laws, USDA was assigned certain specific responsibilities under Public Law 83-518, commonly referred to as the Miller Amendment to the Food, Drug, and Cosmetic Act. This amendment provides for the establishment of safe tolerances for pesticides, that may remain in the form of residues, in or on raw agricultural commodities at time of harvest.

The first law passed by Congress dealing with insecticides was in 1910, known as the "Insecticide Act." It was a simple labeling law designed to regulate the few products then in use, such a Paris green, lead arsenate, nicotine, and bordeaux mixture. Enforcement of the act consisted primarily in testing the ingredients of the insecticides and fungicides, to make sure the composition and quantity of the product were as stated on the label. Failure to comply with the act was cause for seizure of the shipment or prosecution of the shipper.

During the next 37 years, many chemicals were added, and formulations became much more complex. By the end of World War II the original Insecticide Act was obsolete.

In 1947, the act was amended by passage of the Federal Insecticide, Fungicide, and Rodenticide Act. The more important changes included broadening the scope of the law to include herbicides, rodenticides, sanitizers, and disinfectants.

In addition, registration of a label was required before a pesticide was offered for shipment interstate, thus shifting the emphasis to prevention of violation, rather than depending upon seizures of adulterated or falsely labeled products.

The label was also required to include adequate precautionary information to protect the user and the general public.

When applying for registration, the manufacturer of the pesticide is required to furnish pertinent information on the composition of the material, rate and timing of application, and the precautionary measures to be observed. When use on food crops is involved, the amount of residue—if any—remaining is also required. If residues are present, registration is delayed until tolerances are established.

The facts presented when registration of a label is applied for are then reviewed by Department of Agriculture chemists, entomologists, phamacologists, plant pathologists, herbicide specialists, or bacteriologists, as the case may warrant.

The latest change in this law was in 1959, when the scope of the act was extended to include nematocides, plant regulators, defoliants, and desiccants.

As mentioned earlier, the Miller Amendment covers those products added in 1959. Of course, if a product is evaluated and recognized as safe, a tolerance or exemption is not required.

To set the tolerance procedure in motion, the Department of Agriculture must certify to the Food and Drug Administration that the chemical has a useful place in agriculture. The Department must also express an opinion that the tolerance proposed reasonably reflects the residues likely to result when the pesticide chemical is used as directed. So far, more than 2,200 tolerances for about 110 pesticide chemicals for use on various food crops have been established.

Tolerances are not always established uniformly on all crops. For example, the tolerances for methoxychlor will vary from 14 ppm. on apples to 100 ppm. on alfalfa. Methoxychlor, like all other chemicals, also carries a zero tolerance in milk. This wide variation in tolerances is because the Food and Drug Administration has set up the following policy: Tolerances will never be set above the safety limit of a specific pesticide but they should also reasonably reflect the amounts necessary to cover the residues likely to remain on the individual crop involved, when the chemical is used in accordance with label directions.

It should be pointed out that the absence of a tolerance does not necessarily mean that a particular pesticide chemical may not be used. When evidence is available to prove that the proposed use of a chemical will leave no residue, the Department of Agriculture registers such products on a "no residue" basis and no tolerance is needed. Under such conditions of use, FDA may establish a tolerance if a petition is filed, but the tolerance cannot be greater than zero.

Often new chemicals are introduced first for restricted use, which will leave no residue. If later experience shows that under certain conditions residues of the chemical remain, then tolerances must be established. As an example, a chemical applied thirty days before harvest may leave no residue but if used up to 15 days before harvest a residue may result.

As stated earlier, cotton seed is subject to the Miller Amendment and, therefore, if a pesticide residue is present, a tolerance, or an exemption from tolerance, must be obtained. This is so because cottonseed meal and cake are used as animal feed and cottonseed oil finds use in oleomargarine and in vegetable shortenings. Legal tolerances have been established for a number of pesticides for use in cotton production.

In general, the Miller Amend-

Turn to **PESTICIDES** page 37

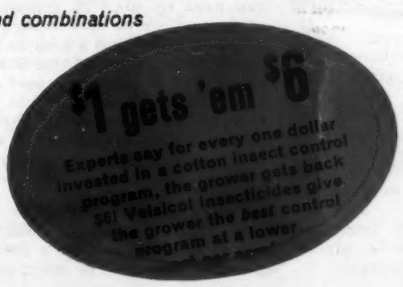
...big sales opportunity for YOU!

Throughout the summer, throughout the cotton belt (from the Carolinas to California) Velsicol Chemical Corporation will run an intensive insecticide promotion that's designed to increase your sales! Although this promotion will cover the area, from coast to coast, it will be concentrated on stimulating business at the local level. Radio, newspaper, TV and outdoor advertising in leading cotton belt trading centers will help you and your dealers right down where the cash register rings. A complete detailed outline of this program is now available. It shows the exact cities, media, dates and ads that will be used to help you build business. Send for your copy today, or ask one of your friends from Velsicol for details.

VELSICOL

HEPTACHLOR * ENDRIN * ENDRIN-METHYL PARATHION

and combinations


$1 gets 'em $6
Experts say for every one dollar invested in a cotton insect control program, the grower gets back $6! Velsicol insecticides give the grower the best control program at a lower

VELSICOL CHEMICAL CORPORATION
330 East Grand Avenue, Chicago 11, Illinois

Gentlemen: C-51

☐ Please send me your "Big Blast" cotton program brochure.

Name_____

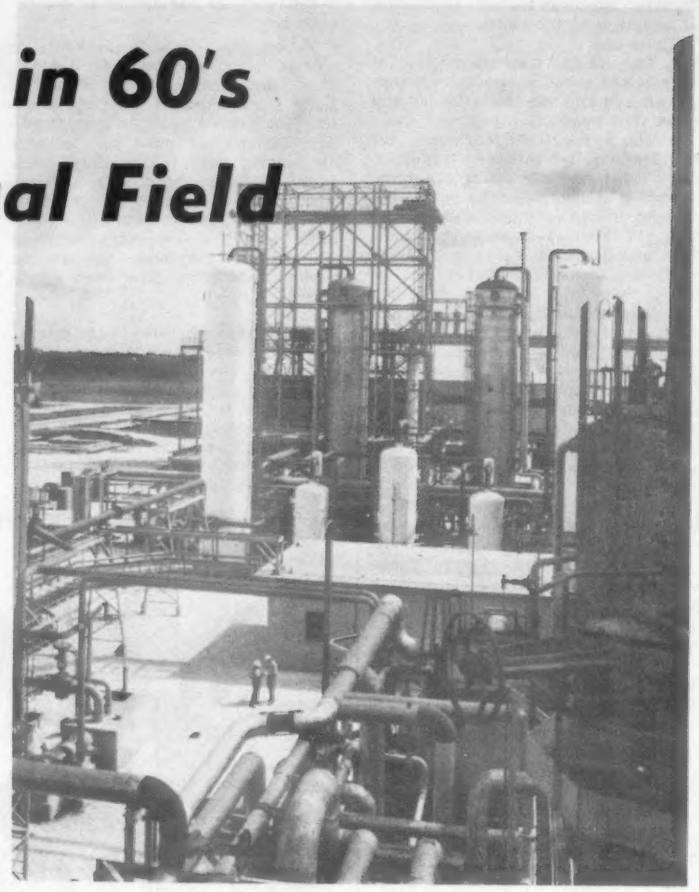
Company_____

Address_____

City_____ Zone____ State_____

VELSICOL INTERNATIONAL CORP., C.A.
P. O. Box 1687, Nassau, Bahamas, B.W.I.

Prospects Bright in 60's For Farm Chemical Field



By O. V. Tracy
Executive Vice President, Chemical Group
W. R. Grace & Company

THE outlook for agricultural chemicals is by and large a healthy one. Of course, like anything else, all is not peaches and cream. We have our problems, too. But, the industry is a growing one favored by an expanding population and a rising standard of living both at home and abroad.

In the U.S. alone the population is expanding at the rate of 1⅓% annually, and some sociologists expect the population of the world may double itself in the 20th century.

Added to this is the fact that people are living longer and better than ever before. The average life expectancy for men and women in this country has gone from age 54 in 1920 to about 70 today. Meanwhile, folks are eating more and better than their parents did. This is because of our higher standard of living. Average family personal income, after taxes, for instance, expressed in current dollar value, has risen from $2,320 in 1929 to $5,880 in 1959.

What does this all mean to the individual farmer? All other things considered equal, the successful farmer seems to be the fellow that keeps up with modern farming developments and has the ability to finance these new ideas into practice on his farm. By the same logic, those who fail do not capitalize on these opportunities.

Agricultural economists are fond of describing this highly competitive situation as the trend toward "less farmers and bigger farms." This trend is responsible for our huge surpluses. Faced with the economic necessity of keeping unit costs competitive, farmers try to increase yields. Obviously, there is really only one way to do this and that is by growing more crops on existing land.

Yet, looking ahead, there is the prospect that we will not always have the benefit of huge crop surpluses. As the world's population skyrockets, these surpluses may become a part of history.

To meet the growing demands of the future, the existing land must be farmed more efficiently. Presently, the lack of knowledge and the traditional conservatism of farmers to accept something new are the principal handicaps to raising productivity. But, this is being slowly overcome as farmers become more aware of the benefits of using more agricultural chemicals.

We expect, in view of these and other trends, that farmers will use a lot more chemicals in the 60's. Last year, for instance, fertilizer sales were pegged at $1 billion while pesticide sales were about $285 million. By 1975, the expectation is that fertilizer sales may reach $2 billion and pesticides may be up around $1 billion.

The money available for production costs is generally considered one of the best barometers for projecting sales of agricultural chemicals. Net farm income in 1959 was a solid $11.8 billion and farmers expended $26 billion for production costs. Farm cash receipts, which have risen from $9.1 billion to $33 billion in 20 years, are the best indicator of the growth in farm purchasing power.

Farm buying habits are known to be conservative and hard to change. Yet, it is good economics for farmers to purchase more agricultural chemicals. Other things being equal, farmers may expect a 200 to 300% return on crops for dollars invested in fertilizer, for example. But, farmers in nine southeastern states, traditionally the heaviest fertilizer user region, use less than half the amount of fertilizer recommended by state college agriculturists.

As far as fertilizer research is concerned, we expect several interesting things will happen. The trend toward higher analysis materials should continue.

Urea with the highest nitrogen content (45%) of any solid fertilizer has enjoyed increasing popularity. It is completely soluble in rain or irrigation water and, like nitrate, moves quickly on down the plant's root zone.

Once regarded as a specialty product which commanded a high price and was used only on high value crops such as fruit and vegetables, urea now is finding its way across all agricultural land, either in mixed fertilizers or alone as a side dressing for nitrogen enrichment. Progress is being made in using urea in mixed fertilizers.

Researchers are also spending time in figuring out how to match the availability of fertilizers to plant needs. The need for new fertilizers of controlled solubility is being recognized in the development of such products as monodicalcium phosphate, metal ammonium phosphate, urea-form and frits.

Phosphates with their universal importance have come in for a share of research interest, too. Today, the trend in phosphate fertilizer is away from the shipping of bulky low analysis materials to concentrated forms such as triple superphosphate (46% plant food), ammonia phosphates (up to 75% plant food) and for liquid fertilizer applications, phosphoric and superphosphoric acid (54 to 75% plant food) and emphasis on even more concentration.

All of these products involve less handling, avoid the necessity of shipping unnecessary contaminators or diluents across the country or world and in most cases promote availability of nutrients to crops.

Of course, as is the case with nitrogen and many other chemicals, fertilizer by no means constitutes the sole importance of phosphate. It is used for industrial production of items ranging from detergents and tooth paste to gasoline additives. Each of these uses has commanded extensive research both in development and application.

Specialty fertilizers for non-farm use will come in for special attention. My company, for instance, is working on a "fool-proof" fertilizer for the growing homeowner market—one that won't burn the roots of the seedling plant no matter how much is used.

Reforestation probably offers one of the greatest growth potentials for non-farm fertilizers. In 1959, two billion trees were planted on an estimated 2.1 billion acres of land.

The economics of forest fertilization is still in the early stages of development, but tests conducted by state experimental stations indicate the project is feasible.

In addition to the basic plant nutrients (macronutrients) nitrogen, phosphate and potash, increasing attention is being devoted to the "trace elements." The term "trace element" comes from a custom of the analytical chemist to report the presence of elements that he could detect, but which were present in such small amounts as to be insignificant.

To determine macro and micronutrient needs accurately, a soil should be tested. Practically every soil has a slightly different nutrient requirement. This can be readily appreciated by the fact that today in this country there are almost 1,600 different grades of fertilizer sold.

Pesticides, which include insecticides, fungicides, herbicides and fumigants, are also occupying the time of chemical researchers.

We are just beginning to recognize the damage done each year by pests and disease. A study of this done by the U.S. Department of Agriculture in 1954 showed that up to $5 billion loss a year in crops could be contributed to weeds alone. Forest pesticides used relatively little at present should grow sharply. It is estimated that insects kill the equivalent of seven billion board feet of lumber per year.

It doesn't seem to make much sense that a farmer should spend time and trouble to raise a good crop and then have a lot of insects eat up his profits before the harvest or while the grain or crop is being stored.

Of course, on the hazard side of the picture, there is the problem of mounting costs and shrinking profits. Adverse publicity concerning the health and safety of a few chemicals has aroused the fears of the public. Government officials are reluctant to approve any new product until it has passed extensive tests. Heavy expenditures are required to put the product through all the market tests as well as equally high expenses to promote and market the product once it has won government approval. Add to this the heavy costs of research and you have a very expensive proposition.

In the '60's we will feel the full impact of the European Common Market in competing abroad. At home, U.S. manufacturers will be threatened more often by imported materials offered at cut rate prices. The St. Lawrence Seaway also extends this possibility to the midwestern states as well as in our coastal markets. Over-all, surplus capacity in fertilizers should extend into the '60's. By 1965, for instance, more than 2.25 million tons of additional nitrogen capacity will be on stream.

There are some hopes that the present import-export imbalance will correct itself. The five-year program by the UN's Food and Agriculture Organization to raise the world's food production by getting farmers to use more fertilizers is one of those hopes. To capitalize on these programs, however, American fertilizer manufacturers would do well to think of supplying technical aid to farmers in depressed areas in teaching them how to use fertilizers.

The market is certainly there. It has been estimated that 62% of the world's agricultural land is in underdeveloped countries that sorely need fertilizer.

It's a well known fact that the chemical industry as such has had a better growth rate than the rest of industry and agricultural chemicals as a segment have shared in that growth.

Dothan, Ala., Is Site of New Pesticide Manufacturing Plant for Niagara Chemical

DOTHAN, ALA.—A new pesticide formulating plant at Dothan, Ala., has been established by Niagara Chemical Division of Food Machinery and Chemical Corp., it was announced by Stuart Bear, division manager. The new unit will produce insecticide and fungicide formulations for the cotton, peanut, peach, tobacco, soybean, and vegetable crops of southeastern Alabama, northwest Florida, and southwest Georgia.

Situated in an existing 16,000 square foot building on Alabama Highway 53, the plant contains new modern blending and mixing equipment. It will turn out pesticide dusts and sprays designed to control boll weevil, boll worm, aphid, thrip, mite, peachtree borer, bacterial blight, and other insect and plant disease problems which plague area growers. Among the products the Dothan facility will make are formulations of methyl parathion, malathion, sulphur, DDT, Sevin, ethion, and Thiodan® insecticide.

James M. Swilly—previously a foreman at Niagara's Jacksonville, Fla., plant—has been named production manager. He has served with the company since 1954.

The plant will function as part of Niagara's Southeastern agricultural department managed by George C. Duckworth and headquartered at Jacksonville. In addition to the Dothan unit, Niagara operates 21 plants in the United States, Canada and Mexico.

New Sales Position

CLEVELAND — C. T. Robertson has been named as new district sales manager for the Cleveland area for the Pittsburgh Plate Glass Co.'s chemical division sales office, succeeding Alfred E. Shaw, who retired after nearly 30 years of service.

POPULARITY OF HERBICIDES INCREASES WITH WITCHWEED

• • •

CLEMSON, S.C.—The old saying about "Blessings in disguise" may not be just talk. South Carolina's witchweed problem is proving to be just that.

The hard-fought campaign against this parasitic weed in the Carolina coastal plain is producing some unexpected side-effects—farmers in the Pee Dee section have been thoroughly "sold" on the value of weed-killers for their crops.

Herbicides have proved effective against witchweed, as well as many other weeds, and farmers are really using them now.

Consequently, it's a hard matter to find a corn field anywhere in this part of the state with any kind of a weed growing in it.

Loule H. Senn, assistant state entomologist at Clemson College, says the sharp increase in the use of herbicides can be largely attributed to the "witch-feed fight."

During 1960, figures from the South Carolina State Crop Pest Commission reveal that same 75,000 acres in South Carolina were sprayed with 2,4-D in the witchweed battle. There were a few cases of slight injury to susceptible adjoining crops, but not a single case of serious injury from 2,4-D spray.

W. R. Grace Expands Research Center Facility

CLARKSVILLE, MD.—New facilities valued at more than $500,000 have been erected at W. R. Grace & Co.'s central research facility in Clarksville, Md., to handle the expanded activities of the new product development and agricultural chemicals research departments.

The 6,000 sq. ft. new product development building will be devoted to meeting the application work requirements of new products which originate in other research departments at the center. Equipment to be set up in this installation includes mills, extruders, injection molding machines and other items of equipment. Also to be included are machines for the grinding and sizing of fine size organic and inorganic materials.

A second structure recently located on the grounds of the Washington Research Center is an all-aluminum greenhouse, one of the first of its kind to be situated in this area. The Agricultural Chemicals Research Department will use it primarily for fertilizer research.

TGS Awards Potash Shaft-Sinking Contract

MOAB, UTAH — Texas Gulf Sulphur has recently announced the award to Harrison International of the shaft sinking and underground construction contract for development of the company's potash beds near Moab, Utah. A contract for building a milling plant and other surface facilities was previously awarded to Sterns-Rogers Mfg. Co., already at work on the project. Capital expenditures for the entire project are estimated at $30 million.

Harrison International has sunk over 500 mining shafts, more than 50 of which descended in excess of 3,000 ft.

Harrison International says it will need some 60 to 80 employees for the shaft work. Schedules call for the shaft to reach the potash formation in the latter half of 1962.

NEW DISTRIBUTOR

CEDAR RAPIDS, IOWA — Nelson Trailer & Body Co., Inc., Rockford, Ill., is a new distributor for Highway Equipment Co. of Cedar Rapids. They handle "New Leader" line of fertilizer and lime spreaders and mobile blenders.

WANTED:

far-sighted salesmen to sell new fertilizers a new way in the Midwest

Effective October, 1961, fertilizers will be sold a new way in the Midwest. They will be sold as part of a program. A program tailored to specific soils and crops, that begins with planting and follows right through to plentiful harvest. In short, an ORTHO fertilizer program.

What is this new way of selling?

To put it simply, it is selling *results*, rather than a product. It is selling the increased yields and higher profits fertilizers can bring, rather than fertilizers themselves. ORTHO has sold fertilizers this way in the West for years, with outstanding results. The ORTHO fertilizer program is something farmers have come to rely on. Soon, for the first time, the kind of fertilizers used in an ORTHO program will be available in the Midwest. They will be made in an entirely new way, by an exclusive process, at a huge new 22 million dollar facility being built at Fort Madison, Iowa.

What kind of man is needed to sell them?

First and foremost, he must be interested in doing something for somebody else. Because this man's whole premise in selling ORTHO fertilizer in an ORTHO program is to *help the farmer increase yields, and make money* with the products he sells. Because the company he will work for—the California Chemical Company—is not just interested in sales today. They are interested in the long-term growth of agriculture in the Midwest. Education? A college degree or the equivalent. Experience? At least two or three years of successful selling.

What does this company offer him?

Most important – rewarding work. The ORTHO slogan is "Helping the World Grow Better". Men who work for this company will be doing exactly that. Opportunity for advancement is unlimited. A man can grow within, and *with*, a company which – already a world leader in agricultural pesticides – is heading for new horizons in the exciting field of petrochemicals. Fringe benefits are far above average—the same as those of the parent company, Standard Oil Company of California. Applicants are being hired right now. Send resume of experience, with a letter outlining long range aims and ambitions, to Mr. E. H. Solinsky, California Chemical Co., Ortho Div., 200 Bush St., San Francisco, Calif. Replies will be held in strict confidence.

ORTHO

HELPING THE WORLD GROW BETTER

WHAT'S NEW
IN PRODUCTS · SERVICES · LITERATURE

To obtain more information about items mentioned in this department simply: (1) Clip out the entire coupon in the lower corner of this page. (2) Circle the numbers of the items of which you want more information. Fill in the name and address portions. (3) Fold the coupon double with the return address portion on the outside and fasten the edges with a staple, cellophane tape or glue. (4) Drop in the mail box.

No. 9367—Rust Arrester

Colloidal Products Corp. has announced the availability of a new rust arrester, which it describes as being a completely new type of rust inhibitor. The makers claim that this product provides a simple and economical solution to rust problems on metal surfaces; that it creates a uniform coating of tank interiors, and gives a surface resistant to the formation of rust; and that it is effective under difficult conditions. Metal surfaces, they say, need not be completely dry, as this rust arrester product will displace any moisture present.

The product also prevents scale formation, which the makers say reduces "down time" and prevents clogged valves, screens and nozzles. Complete information on the rust arrester product is available by checking No. 9367 on the coupon and mailing.

No. 9375—Air Pollution Analyzer

A new type of automatic analyzer to determine traces of sulfur dioxide contaminants in the atmosphere has

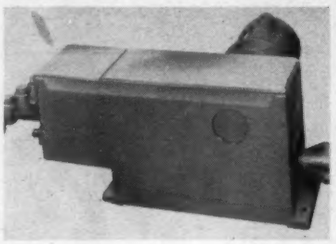
been developed by Technicon Controls, Inc. The instrument's sensitivity is reported to be great enough to show air contamination as low as 0.006 ppm. According to the manufacturers, use of the "Auto-Analyzer" reduces analytical manhour requirements and makes it possible for one individual to analyze as many as 36 samples an hour without measuring samples or reagents by hand. The equipment automates the steps of sample measuring, mixing, purifying, processing, comparing, and writing into one continuous flow system providing permanently recorded results, the makers state. For complete information on how the equipment operates, check No. 9375 on the coupon and mail.

No. 9365—Dust Filter Tube Cleaning Service

A new service for cleaning, repairing and reconditioning filter tubes and sleeves used in filter type dust collectors has been announced by the Day Sales Co. The company says that tubes of all types, sizes and materials, including felted wools, orlons, nylon and dacron will be handled. The service, the company says, includes vacuum cleaning, thorough dry cleaning, inspecting filter sleeves for quality and size, splicing in new material when required, and adding new tape and stitching. The Day Co. says that this complete rejuvenating service restores the original porosity of the cloth or felt tubes. For complete information on this service, check No. 9365 on the coupon and mail.

No. 9366—Low-Flow Metering Pump

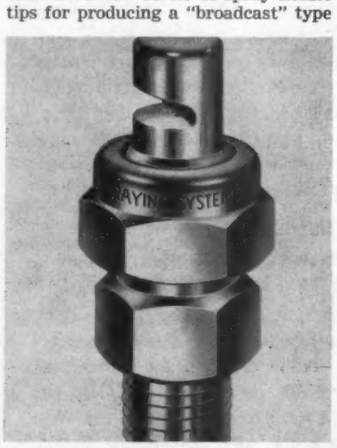
Milton Roy Co. offers a new low-flow, controlled volume metering pump for liquid chemical feed sys-



tems. A basic feature of the pump is a patent drive unit and speed reducer, including a new method for stroke length adjustment. All working parts of the drive operate in an oil bath, the makers state. The drive converts the high speed rotary motion of the drive motor into the reciprocating motion of the pump plunger. The makers claim that the pump may be equipped with a leak-proof diaphragm liquid end or the conventional packed plunger liquid end. They say it will meter accurately many types of liquids, including corrosive acids and toxic chemicals. Capacity adjustments can be made while the pump is running, either manually or automatically from a control signal. For complete details on the metering pump, check No. 9366 on the coupon and mail.

No. 9371—Wide Spray Tips for Nozzles

Spraying Systems Co. has announced a new series of spray nozzle tips for producing a "broadcast" type

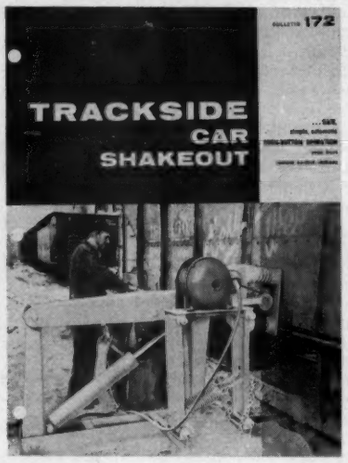


spray with boom-mounted "TeeJet Spray Nozzles." These tips provide a flat, 120° angle spray projected at an angle of 75° to the spray nozzle axis.

The makers claim that this wide angle spray permits close-to-ground mounting of the spray nozzle. This feature, plus low line pressures, can help to eliminate driftage. Application for use of these nozzles includes spraying of pre-emergence chemicals and nitrogen fertilizers. For complete information on the products, check No. 9371 on the coupon and mail.

No. 9376—Trackside Shakeout Equipment

Hewitt-Robins Co. has issued descriptive literature on its new trackside shakeout for aid in emptying



hopper bottom railroad cars. Complete pushbutton control makes the shakeout a one-man job, the makers state. Equipment can be operated automatically from remote control station and the equipment is efficient when up to eight cars a day need unloading, but economical at much less than this volume. The vibrating head sets automatically against the side of the car, giving more than 14 tons of vibrating force when applied. For full information on the device, check No. 9376 on the coupon and mail.

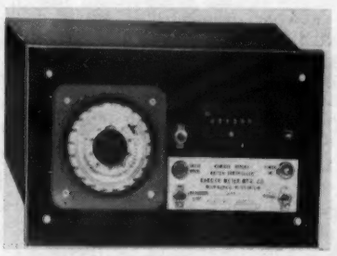
No. 9362—Fiberglass Tanks

Tryco Manufacturing Co. offers information on its new fiberglass tanks for holding agricultural solutions, in-

cluding mixed liquid fertilizer, nitrogen solutions, phosphoric acid, and herbicides. The company claims that the tanks might be used as nurse tanks also. The latest model, a 600-gallon molded fiberglass tank, is being offered to the trade. This tank, according to the makers, gives the user a large storage capacity and extremely light weight. The product eliminates rust and corrosion and requires practically no maintenance. Complete information is available by checking No. 9362 on the coupon and mailing.

No. 9363—Remote Control Batch Meter

A remote control device for repeat batch metering of liquids has been introduced by the Badger Meter



Manufacturing Co. The device is said to allow plant personnel to control

(Continued on page 20)

Send me information on the items marked:

- ☐ No. 9340—Bin Vibrators
- ☐ No. 9359—Liquid Fertilizer Plant
- ☐ No. 9360—Gas Scrubbers
- ☐ No. 9361—Processing Equipment
- ☐ No. 9362—Fiberglass Tanks
- ☐ No. 9363—Remote Control Batch Meter
- ☐ No. 9365—Dust Filter Tube Cleaning Service
- ☐ No. 9366—Low-Flow Metering Pump
- ☐ No. 9367—Rust Arrester
- ☐ No. 9368—Automatic Bag Printer
- ☐ No. 9369—Dry Fertilizer Spreader
- ☐ No. 9371—Wide-Spray Tips for Nozzles
- ☐ No. 9373—Stencil Printing Process
- ☐ No. 9375—Air Pollution Analyzer
- ☐ No. 9376—Trackside Shakeout Equipment
- ☐ No. 9377—Feeders of Dry Materials
- ☐ No. 9378—Fiberglass Plastic Processing Vessels

(PLEASE PRINT OR TYPE) COUPON NOT VALID AFTER 60 DAYS

NAME .....

COMPANY .....

ADDRESS .....

CLIP OUT—FOLD OVER ON THIS LINE—FASTEN (STAPLE, TAPE, GLUE)—MAIL

FIRST CLASS PERMIT No. 2 (Sec. 34.9, P. L. & R.) MINNEAPOLIS, MINN.

BUSINESS REPLY ENVELOPE
No postage stamp necessary if mailed in the United States

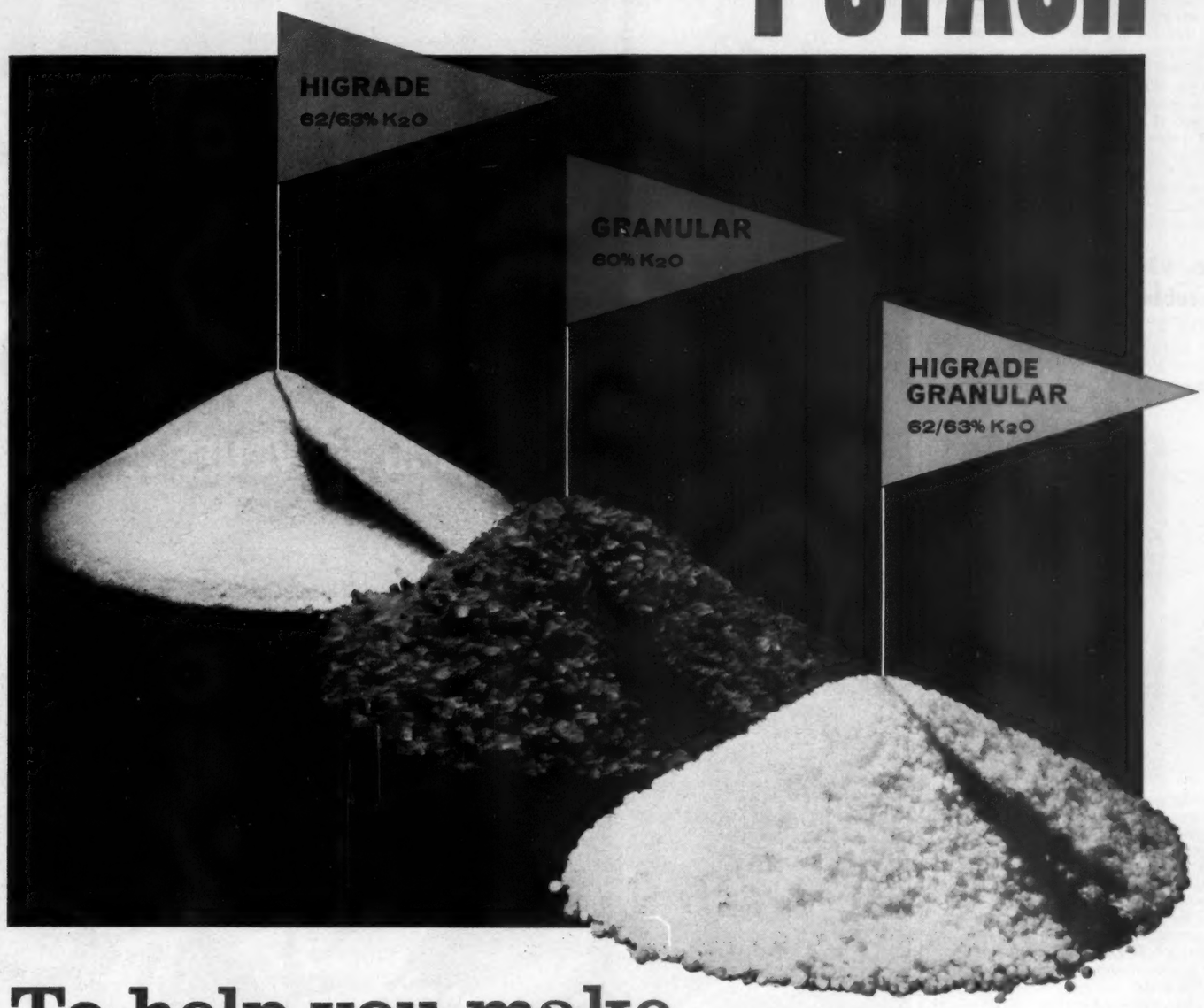
POSTAGE WILL BE PAID BY—

Croplife

P. O. Box 67

Reader Service Dept. Minneapolis 40, Minn.

For you--3 types of specially sized POTASH



To help you make the best fertilizers...

Here is potash you can depend upon—for highest quality—for maximum freedom from caking in storage and handling. Take your choice of three types; all readily available for immediate shipment. You'll find each to be ideally sized to meet your current manufacturing requirements.

For more than a quarter of a century, our potash products have kept pace with all the exacting specifications of the fertilizer industry. That's why you can count confidently on getting exactly the kind of potash you want...when you want it... from the U. S. Borax & Chemical Corporation.

Expert technical assistance is yours for the asking—without any obligation. Write today for technical data and shipping information.

Now Available!

FERTILIZER BORATE-65

...A NEW SOURCE OF BORON TO SAVE YOU MONEY!

Here's boron at lowest cost per unit! This highly concentrated source of B_2O_3 has a 178% borax equivalent. It can save dollars for you on costs of handling... storage... and transportation. It can also improve the physical condition of your mixed fertilizers.

Order Fertilizer Borate-65 now!

50 Rockefeller Plaza, New York 20, N.Y.

Sales Offices in:
ATLANTA • CHICAGO • LOS ANGELES

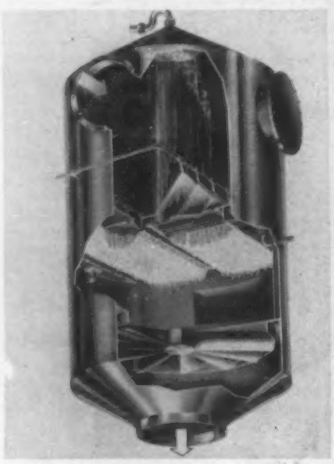
U.S. BORAX

automatically the measuring, mixing, blending or batching of fluids from a convenient location far away from the meter itself. Available on all sizes of Badger meters, the controller is said to be capable of handling repeat batches up to 1,000 gallons.

The remote controller is equipped with a reset totalizer, a counter to set the batch quantity desired, a push button start switch and a stop switch for interrupting the batching operation when necessary. The controller is pulsed by a momentary pulsing switch. When the batch quantity has been selected on the dial, the push button is pressed to open the control valve, which is attached to the outside of the meter and starts the liquid to flow. Specifications and dimensions of these devices can be obtained by checking No. 9363 on the coupon and mailing.

No. 9360—Gas Scrubbers

The W. W. Sly Manufacturing Co. has announced a new line of impingement-plate-type scrubbers for wet



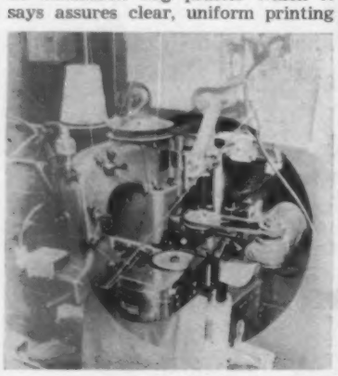
cleaning, absorption, or cooling of gases in industrial processes. The scrubber is said to provide a high efficiency scrubbing action with low operating and maintenance costs. Both single and multiple units are available.

The makers state that scrubbing is accomplished by the turbulent interaction of gas and liquid, as effected by the stainless steel impingement baffle plate.

The single stage scrubber is claimed to handle dust loadings at inlet of up to 100 grains per cubic foot. It can remove suspended materials in a gas stream that range from sub-micron fumes to dust particles in the larger micron sizes, with efficiency in excess of 99% on many types of dust. The makers claim that because of its simple design, pressure drop and resultant power requirements for the scrubber are low. For complete information on the scrubber, check No. 9360 on the coupon and mail.

No. 9368—Automatic Bag Printer

Bemis Bro. Bag Co. has developed an automatic bag printer which it says assures clear, uniform printing



of product specifications or code above the sewing line of sewn multiwall paper bags. The printer is mounted on a sewing pedestal and prints the bag as it is being sewn closed, the company says. The unit utilizes an ink roll, rather than fluid inks. Bemis states that the device is simple to set up and easy to maintain. Type on the rotary print wheel can be changed quickly or can be swung clear of the packing line if printed matter is not wanted. Printing speed is set by a variable speed sheave on the motor, synchronized with the speed of the conveyor and sewing head. In operation, the makers say, attendants simply lead the edge of the bag into the printing guide. From this point, the bag is coded and an actuator starts the sewing head to sew the bag. The thread is automatically cut when the bag leaves the sewing head. For complete information on the bag printer, check No. 9368 on the coupon.

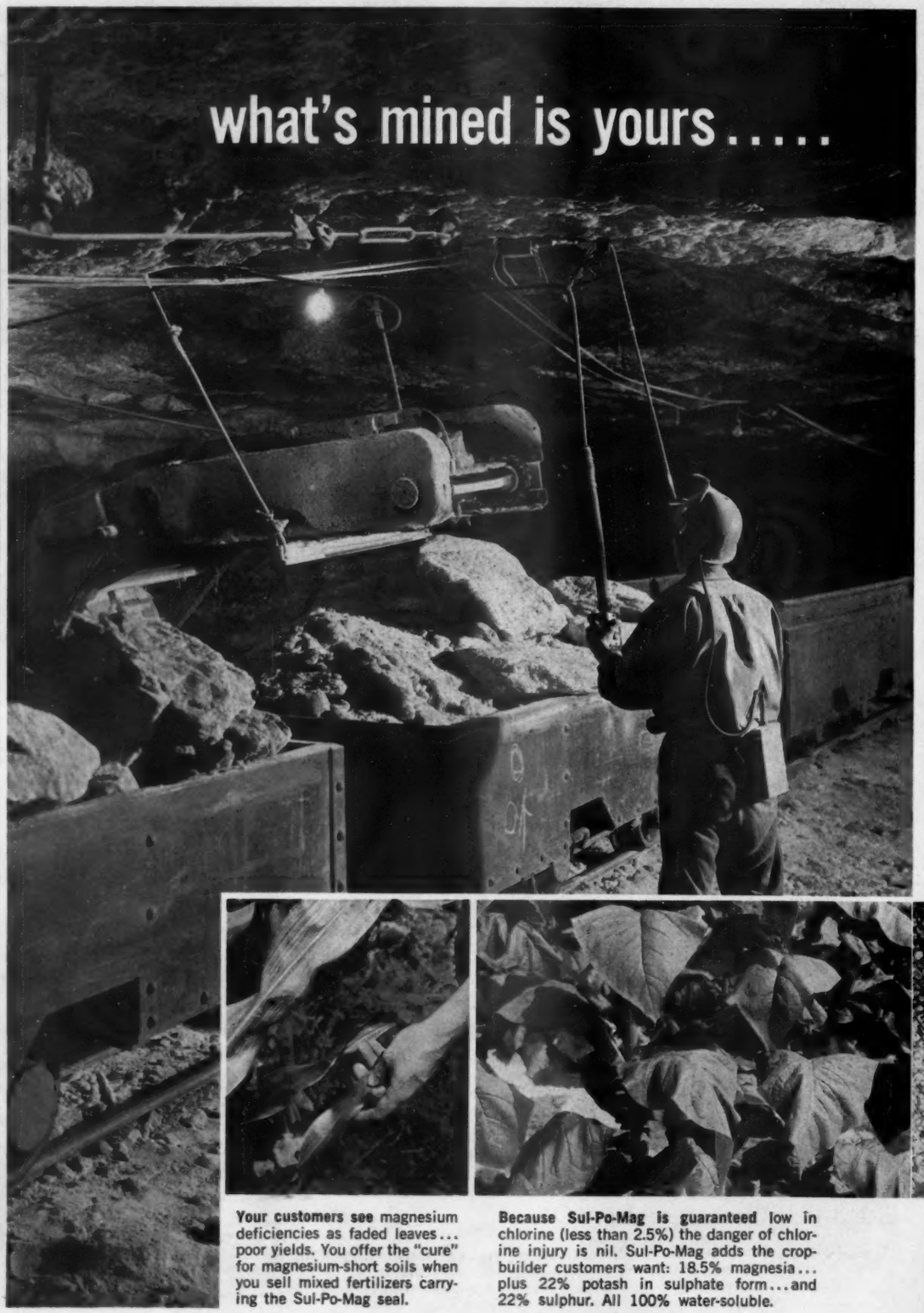
No. 9369—Dry Fertilizer Spreader

Calhoun Manufacturing Co., Inc., offers a new "Speed-Spred" fertilizer spreader for use of manufacturers

who wish to lease equipment to users or to apply on a custom basis. According to its makers, the spreader was engineered to minimize soil compaction. The unit has a capacity of 2,000 lb. of granular fertilizer, but weighs only 600 lb. itself. It can be used in any field where a tractor can operate, according to the makers. The unit can spread fertilizer in an even pattern up to 40 ft. wide, it is claimed. Its propelling fan operates at 650 rpm. The feed apron is ground driven with a control clutch from the driver's seat. For complete information check No. 9369 on the coupon and mail.

No. 9359—Liquid Fertilizer Plant

Agricultural Business Co., Inc., has developed a balanced liquid fertilizer plant which it is now introducing to the industry. The basic unit is said to produce balanced liquid fertilizer in a continuous process at a low initial cost and minimum maintenance requirement. The plant can turn out 8-24-0 at the rate of 15 tons an hour.



Your customers see magnesium deficiencies as faded leaves... poor yields. You offer the "cure" for magnesium-short soils when you sell mixed fertilizers carrying the Sul-Po-Mag seal.

Because Sul-Po-Mag is guaranteed low in chlorine (less than 2.5%) the danger of chlorine injury is nil. Sul-Po-Mag adds the crop-builder customers want: 18.5% magnesia... plus 22% potash in sulphate form...and 22% sulphur. All 100% water-soluble.

The makers state that the plant does not necessarily need a building, being functionally designed. It incorporates a self-contained automatic bulk potash system, a high analysis system which utilizes suspensions or super acid in automatic controls. There is also a separate aqua ammonia system permitting the sale of this product by itself. For more information about this plant, check No. 9379 on the coupon and mail.

No. 9340—Bin Vibrators

A new, illustrated, six-page brochure describing its complete line of unit (bin) vibrators is being offered by Eriez Manufacturing Co. to handlers of all types of bulk materials.

Nine models are available, all AC operated, needing no rectifiers and all providing pinpointed vibration for top performance on hoppers, bins and chutes, reports the company.

The range in sizes runs from the little ION to handle bins with up to 20 ga. wall thickness and 2 cu. ft. capacity to the largest size, the 70U for use on bins with ½ in. thickness and approximately 50 ton capacity. On larger, heavier bins, more than one vibrator can be mounted for satisfactory performance, reports the company.

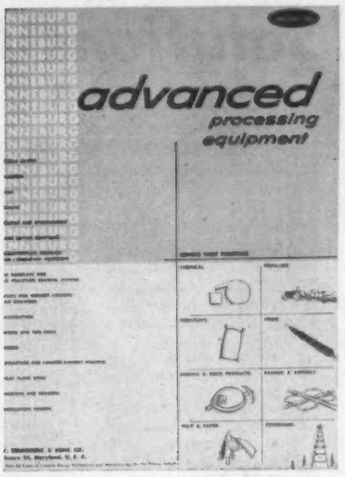
The brochure points out that vibrators in the larger units, the 60U and 70U, produce a double impact because the hammer strikes the anvil on both top and bottom of the stroke, giving 7200 impacts per minute.

Also included in the brochure are pictures of actual installations and how they are mounted on bins and chutes, and explanations on how to choose the correct unit for specific jobs. Another page contains drawings and explanations of applications of the vibrators on various shapes of bins, hoppers and chutes.

For additional information and a copy of this brochure, check No. 9340 on the coupon and mail.

No. 9361—Processing Equipment

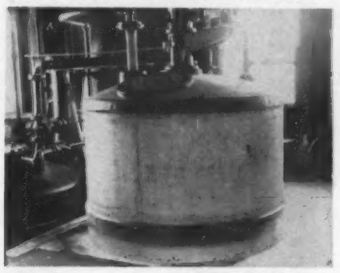
Edw. Renneburg & Sons Co. has issued a general bulletin featuring its processing equipment for the fertilizer industry and other chemical processing industries. The 16-page



bulletin, in color, pictures the company's line of rotary dryers, coolers, air pollution control systems, granulators, mixers and pug mills, and pilot plant units. Full descriptions and other details of the equipment are outlined. For a copy of the bulletin designated as G560, please check No. 9361 on the coupon and mail.

No. 9378—Fiberglass Plastic Processing Vessels

A new line of fiberglass plastic processing vessels has been offered by Jones & Hunt, Inc. These vessels,



according to the makers, provide corrosion resistance and self-supporting structural strength. Ten standardized diameters are available with various capacities for 50 to 70,000 gallons. The basic tank is translucent with a molded-in direct reading gauge. Liquid level is always visible during batching and processing operations, the makers say. All tubing, fixtures, such as agitator and plate coils, are corrosion-resistant. For full information, check No. 9378 on the coupon.

No. 9377—Feeders of Dry Materials

A new brochure which details its dry feeder equipment has been issued by Tower Iron Works, Inc. The brochure, strictly technical in nature, shows charts and graphs indicating cubic feet per minute capacities of the company's dry feeders at various rpm.'s, design features, and the pre-engineered sizes available. The bulletin describes the feeder as being rugged and compact, available in alloys or carbon steel, and with corrosion resistant coatings if necessary. For complete details on feeder, check No. 9377 on the coupon and mail.

No. 9373—Stencil Printing Process

A means of marking drums with an ink roller has been devised by the Diagraph-Bradley Industries. A new method of printing on drums or other containers is accomplished by cut-out stencils used in connection with a roller type applicator of ink. The makers state that this method makes legible stenciling even on reconditioned drums. The stencil is made to fit drum heads perfectly and fast production is possible by using this method, the makers state. For full information on this stenciling method, check No. 9373 on the coupon.

..in SUL-PO-MAG

the superior magnesium source that gives your mixed fertilizer the ALL-SEASON ACTION for top-tonnage sales!

S·P·M PREMIUM — Quality fertilizer containing sulphate of potash obtained from Sul·Po·Mag (DOUBLE SULPHATE OF POTASH & MAGNESIA)

From the langebeinite ore of IMC's Carlsbad, New Mexico mine comes Sul-Po-Mag . . . the magnesium source that adds bonus sales-appeal to your mixed fertilizers.

Sul-Po-Mag puts the plus-factor in your products . . . adds positive protection against crop loss or reduced yields due to common magnesium deficiencies.

It's the superior magnesium source. Granular, 100% soluble (but slow-dissolving) for all-season crop-feeding action, Sul-Po-Mag doesn't leach out as quickly — doesn't have to rely on acids from roots and soils to make it available.

Sul-Po-Mag gives your mixed fertilizers the big competitive advantage. Helps you profit from the extra sales-power generated by IMC's direct-to-customer sales campaign. That's why it's easier to hit top-tonnage sales seasons with Sul-Po-Mag in your mixed fertilizers. For more information about the product and the Sul-Po-Mag sales program, write IMC, c/o the address below.

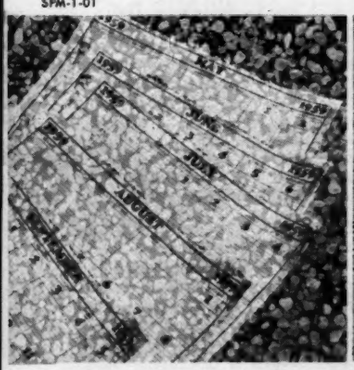
AGRICULTURAL CHEMICALS DIVISION

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

ADMINISTRATIVE CENTER: SKOKIE, ILLINOIS

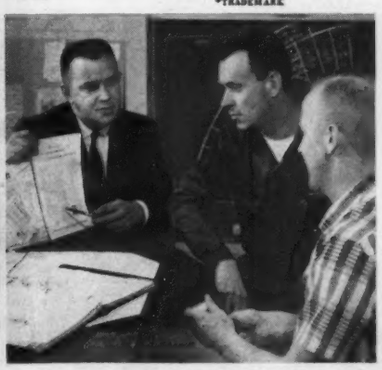
IMC — PRODUCTS FOR GROWTH* *TRADEMARK

SPM-1-01



More performance for the money — Sul-Po-Mag dissolves slowly. Stays available month after month to nourish the crop all through the season. One application does the job with Sul-Po-Mag in the fertilizer.

Customers would rather buy a complete fertilizer containing Sul-Po-Mag. They know the need for magnesium. They want the fertilizer with the built-in magnesium booster to carry their crops through to high-yielding harvests.



You get more sales help from IMC's nationwide Sul-Po-Mag promotion. Powerful IMC advertising . . . hard-working promotion material to sell the Sul-Po-Mag story . . . plus personal attention from IMC men — all help to move more of your product.

Solutions Increase Both Volume and Analysis

Continued from page 1

TABLE 1. Composition of Nitrogen Solutions

Reference No.	Suggested nomenclature	Forms of nitrogen: Total	Neutralizing ammonia	Combined ammonia	Nitrate	Urea	Nitrogen components: Ammonia	Ammonium nitrate	Urea	Water[1]
		%	%	%	%	%	%	%	%	%
1	85(0-0-0-48)[2]	8.5	...	8.5	...	...	...	...	...	40.0
2	160(0-46-0)	16.0	...	8.0	8.0	...	...	45.7	...	54.3
3	170(0-31-0-36)[3]	17.0	...	5.4	11.6	...	...	30.9	...	52.9
4	170(0-49- 0)	17.0	...	8.5	8.5	...	...	48.6	...	51.4
5	175(0-50- 0)	17.6	...	8.8	8.8	...	...	50.0	...	50.0
6	189(0-51- 0)	18.0	...	9.0	9.0	...	...	51.4	...	48.6
7	190(0-54- 0)	19.0	...	9.5	9.5	...	...	54.3	...	45.7
8	200(0-57- 0)	20.0	...	10.0	10.0	...	...	57.2	...	42.8
9	210(0-60- 0)	21.0	...	10.5	10.5	...	...	60.0	...	40.0
10	210(4- 0-38)	21.0	3.5	...	...	17.5	4.3	...	37.5	58.2
11	228(0-65- 0)	22.8	...	11.4	11.4	...	...	65.0	...	35.0
12	245(0-70- 0)	24.6	...	12.3	12.3	...	...	70.0	...	30.0
13	280(0-39-31)	28.1	...	6.9	6.9	14.3	...	39.3	30.6	30.1
14	280(0-40-30)	28.0	...	7.0	7.0	14.0	...	40.1	30.0	29.9
15	280(0-80- 0)	28.0	...	14.0	14.0	...	...	80.0	...	20.0
16	290(0-83- 0)	29.0	...	14.5	14.5	...	...	82.9	...	17.1
17	360(0-42-33)	30.1	...	7.4	7.4	15.3	...	42.2	32.7	25.1
18	315(0- 0-68)[4]	31.5	...	...	...	31.5	...	...	67.5	29.5
19	318(8-72- 0)	31.8	6.6	12.6	12.6	...	9.0	72.0	...	20.0
20	320(0-44-35)	32.1	...	7.8	7.8	16.5	...	44.3	35.4	20.3
21	320(0-45-35)	32.1	...	7.9	7.9	16.3	...	45.0	35.0	20.0
22	384(10-72- 0)	33.4	8.2	12.6	12.6	...	10.0	72.0	...	18.0
23	338(0- 0-72)[5]	33.8	...	...	...	33.8	...	...	72.5	24.5
24	340(19-54- 8)	34.2	15.2	9.5	9.5	...	18.5	54.2	...	27.3
25	370(13-53-16)[6]	36.9	10.9	9.3	9.3	7.4	13.3	53.4	15.9	9.4
26	370(17-67- 8)	37.1	13.7	11.7	11.7	...	16.6	66.8	...	16.6
27	370(25- 0-35)[6]	37.1	20.6	...	...	16.5	25.0	...	35.3	23.3
28	376(0- 0-80)[7]	37.6	...	...	...	37.6	...	...	80.5	16.5
29	405(16-78- 6)	40.6	13.2	12.3	12.3	2.8	16.0	78.0	6.0	8.0
30	405(28- 0-38)[7]	40.5	23.0	...	...	17.5	28.0	...	37.5	22.0
31	410(19-58-11)	41.1	15.6	10.2	10.2	5.1	19.0	58.0	11.0	12.0
32	410(19-66- 5)	41.1	15.6	11.6	11.6	2.3	19.0	66.0	5.0	10.0
33	410(19-73- 0)	41.0	15.6	12.7	12.7	...	19.0	72.5	...	8.5
34	410(22-65- 0)	41.1	18.3	11.4	11.4	...	22.2	65.0	...	12.8
35	410(22-66- 0)	41.0	18.0	11.5	11.5	...	21.9	65.7	...	12.4
36	410(24-60- 0)	41.0	20.0	10.5	10.5	...	24.3	60.0	...	15.7
37	410(26-55- 0)	41.0	21.8	9.6	9.6	...	26.5	55.0	...	18.5
38	410(26-56- 0)	41.0	21.6	9.7	9.7	...	26.3	55.5	...	18.2
39	414(19-66- 6)	41.4	15.6	11.5	11.5	2.8	19.0	65.6	6.0	9.4
40	414(19-74- 0)[8]	41.6	15.6	13.0	13.0	...	19.0	74.0	...	7.0
41	420(20-66- 6)	42.0	16.0	11.6	11.6	2.8	19.5	66.3	6.0	8.2
42	430(20-68- 6)	43.0	16.4	11.9	11.9	2.8	20.0	68.0	6.0	6.0
43	430(22-62- 7)	43.0	17.9	10.9	10.9	3.3	21.8	62.4	7.0	8.8
44	435(28- 0-40-10)[9]	43.7	22.9	2.1	...	18.7	27.8	...	40.0	13.0
45	440(22-66- 6)	44.1	18.1	11.6	11.6	2.8	22.0	66.0	6.0	6.0
46	440(24-56-10)	44.0	19.7	9.8	9.8	4.7	24.0	56.5	10.0	10.0
47	440(24-70- 0)	44.0	19.6	12.2	12.2	...	23.8	69.8	...	6.4
48	440(28-40-15)	44.0	23.8	7.0	7.8	7.0	28.0	40.0	15.0	17.0
49	440(28-60- 0)	44.0	23.0	10.5	10.5	...	28.0	60.0	...	12.0
50	444(25-55-10)[10]	44.5	20.6	9.6	9.6	4.7	25.0	55.0	10.0	10.0
51	444(25-56-10)	44.4	20.1	9.8	9.8	4.7	24.5	56.0	10.0	9.5
52	444(26-50-12)	44.5	21.4	8.8	8.8	5.6	26.0	50.0	12.0	12.0
53	448(25-69- 0)[11]	44.8	23.6	12.1	12.1	...	25.0	69.0	...	6.0
54	450(25-69- 0)	45.0	20.8	12.1	12.1	...	25.3	69.2	...	5.5
55	450(26-68- 0)	45.0	21.2	11.9	11.9	...	25.8	68.0	...	6.2
56	450(26-69- 0)	45.1	21.1	12.0	12.0	...	25.6	68.5	...	5.9
57	450(27-50-12)	45.2	22.8	8.8	8.8	5.6	26.7	50.0	12.0	11.3
58	460(30- 0-43)	46.1	25.0	...	...	20.1	30.4	...	43.0	26.6
59	460(37- 0-32)	46.0	30.1	...	...	14.9	36.6	...	32.0	31.4
60	462(26-68- 0)[12]	46.2	21.4	11.9	11.9	...	26.0	68.0	...	6.0
61	462(30-51- 6)	46.2	24.6	8.9	8.9	2.8	29.9	51.9	6.0	13.1
62	463(31- 0-43)[14]	46.3	25.2	...	...	20.1	30.6	...	43.1	26.3
63	464(37- 0-33)	46.5	30.3	...	...	15.2	36.8	...	32.5	30.7
64	465(30- 0-43)[15]	46.5	25.1	...	...	20.2	30.5	...	43.3	26.2
65	465(32- 0-44)	46.5	26.0	...	...	20.5	31.6	...	44.0	24.4
66	465(32- 0-44)[16]	46.5	26.0	...	...	20.5	31.6	...	44.0	24.4
67	465(38- 0-33)	46.5	31.1	...	...	15.4	37.8	...	33.0	29.2
68	465(39- 0-33)[17]	46.5	31.1	...	...	15.4	37.8	...	33.0	29.2
69	470(30-45- 0)	47.0	24.4	11.3	11.3	...	29.7	64.5	...	5.8
70	471(26-74- 0)	47.2	21.4	12.9	12.9	...	26.0	73.5	...	0.5
71	471(30-64- 0)[18]	47.1	24.7	11.2	11.2	...	30.0	64.0	...	6.0
72	480(33- 0-46)	48.0	26.8	...	...	21.2	32.6	...	45.5	21.9
73	480(39- 0-34)	48.0	32.1	...	...	15.9	39.0	...	34.1	26.9
74	490(33-43-13)	49.1	27.6	7.7	7.7	6.1	33.5	44.0	13.0	9.5
75	490(33-45-13)	49.0	27.1	7.9	7.9	6.1	33.0	45.1	13.1	8.8
76	490(33-55- 6)	49.0	27.0	9.6	9.6	2.8	32.8	55.0	6.0	6.2
77	490(34-60- 0)	49.0	28.0	10.5	10.5	...	34.0	60.0	...	6.0
78	495(37-40-11)	49.5	30.4	7.0	7.0	5.1	37.0	40.0	11.0	12.0
79	499(32-48- 0)	49.9	26.3	11.8	11.8	...	32.0	67.5	...	0.5
80	500(40-50- 0)	50.2	32.6	8.8	8.8	...	39.6	50.0	...	10.4
81	500(41- 0-36)	50.1	33.4	...	...	16.7	40.6	...	35.7	23.7
82	500(43-45- 0)[19]	50.8	35.0	7.9	7.9	...	42.6	44.9	...	12.5
83	510(35- 0-48)	51.0	29.5	...	...	22.5	34.7	...	48.3	17.0
84	515(40-40-10)[20]	51.6	32.9	7.0	7.0	4.7	40.0	40.0	10.0	10.0
85	518(36-64- 0)	51.8	29.6	11.1	11.1	...	36.0	63.5	...	0.5
86	530(49-36- 0)[21]	52.9	40.3	6.3	6.3	...	49.0	36.0	...	15.0
87	540(44-51- 0)	54.0	36.2	8.9	8.9	...	44.0	51.0	...	5.0
88	585(50-59- 0)	58.5	41.1	8.7	8.7	...	50.0	49.5	...	0.5

[1]By difference.
[2]Estimated to contain substantially 60% ammonium bisulfite.
[3]Contains 36.2% calcium nitrate.
[4]Contains 3.0% biuret.
[5]Contains 8.0% formaldehyde.
[6]Contains 8.4% carbon dioxide and 8.0% formaldehyde.
[7]Contains 8.5% carbon dioxide and 4.0% other material.
[8]One producer lists this solution as 415(19-74-0).
[9]Contains 10.0% ammonium sulfate.
[10]Contains 9.2% carbon dioxide.
[11]One producer lists this solution as 445(25-55-10).
[12]One producer lists this solution as 447(25-69-0).
[13]One producer lists this solution as 451(26-68-0).
[14]One producer lists this solution as 452(31-0-43).
[15]Contains 10.0% carbon dioxide
[16]Contains 8.0% carbon dioxide.
[17]Contains 5.5% carbon dioxide.
[18]Two producers list this solution as 470(30-64-0).
[19]Three producers list this solution as 506(43-45-0).
[20]One producer lists this solution as 514(40-40-10).
[21]One producer lists this solution as 529(49-36-0).

significant source of nitrogen is designated by a fourth number within the bracket.

For example, a solution designated 448(25-69-0) would contain 44.8% total nitrogen, 25% ammonia, 69% ammonium nitrate and 0% urea. This system of nomenclature, without the trade names, has been used in this paper to designate solutions of both categories.

The composition and many of the properties of the nitrogen solutions were obtained from brochures and supplemental information supplied by the producers. This assistance is gratefully acknowledged. The tabulated data for solutions made by more than one producer are the averages of the data supplied by each.

Other data, such as the weight of solution per gallon and the weight of nitrogen per gallon of solution have been calculated from the basic information supplied by the producers. Discrepancies between the total nitrogen contents indicated in the suggested nomenclatures and the calculated values are due to the approximate values reported for the percent composition of the solutions and the rounding of calculated figures.

Productive Facilities

There were 24 domestic and three Canadian producers of nitrogen solutions on July 1, 1960. Table 4 lists the producers, the location of their productive facilities and the types of solutions produced. Each of two companies have three plants at different locations and a third company has productive facilities at two locations. Thus nitrogen solutions are available from a total of 32 locations. Seventeen of the plant sites are east and 12 are west of the Mississippi River.

The total number of nitrogen solutions listed for sale on July 1, 1960, was 88 compared with 53 on Aug. 1, 1957[2]. Presumably other solutions were marketed in either year since some manufacturers advertise that they will produce solutions of other concentrations on request.

Ammonia-ammonium nitrate-water solutions were being produced in 1960 by 23 companies and such solutions were the only ones produced by three of them. The production of two companies was confined to ammonia-urea-water solutions and one company, located in Canada, produced only nonpressure solutions. The number of companies producing ammonia-ammonium nitrate-urea-water solutions in 1960 was 50% higher than in 1957. Six manufacturers produce all four types of solutions.

Composition, Nitrogen Solutions

Table 1 lists the reported compositions of the nitrogen solutions and the percentages of the different forms of nitrogen in each solution. The percentages were calculated from the average compositions as reported by the producers. The suggested nomenclature has been taken from producer publications in spite of slight differences between the nomenclature designations and the calculated nitrogen content. Solutions with small percent variations in composition and similar properties are grouped under one name.

There are 67 pressure solutions, of which 29 are ammonia-ammonium nitrate-water, 17 are ammonia-urea-water, and 21 are ammonia-ammonium nitrate-urea-water solu-

[2]J. Richard Adams, Physical and Chemical Characteristics of Commercial Nitrogen Solutions for Fertilizer Use; Off. Publication Assoc. Amer. Fert. Control Off., 11, 66-69 H (1957).

[1]Anonymous. Solution coding system voted by industry group. Farm Chem., 121 (10):51 (1958); Marburger, G. C. Ammoniating solutions; Agr. Chem., 14(8):37-40, 97, 99 (1959).

tions. Ammonium sulfate supplies some of the nitrogen in solution 435(28-0-40-10). Three of the pressure solutions contain biuret and a number of them contain unreacted carbon dioxide. Solutions 370(13-53-16) and 370(25-0-35) contain 8% of formaldehyde which reacts with urea during ammoniation to form a slowly-soluble urea-formaldehyde product.

Three pressure solutions with water contents of only 0.5% were introduced in 1960. It was claimed that the low moisture content lowered the manufacturing costs and improved the quality of the mixed fertilizers produced[3].

Only 21 nonpressure solutions are listed for sale. Ammonium bisulfite is the only source of nitrogen in solution 85(0-0-0-60). The other aqueous solutions comprise 12 ammonium nitrate, 3 urea, and 5 ammonium nitrate-urea solutions. One of the ammonium nitrate solutions (No. 3) also contains calcium nitrate.

Nitrogen Solutions' Properties

The data in Tables 3 and 5 are a compilation of the averages of the data published by the producers, except for the weight of solution per gallon and the weight of nitrogen per gallon of solution. These two properties are calculated from the average specific gravities and the calculated nitrogen content of each solution.

The salting-out temperatures, which are given in column 3 of tables 3 and 5, are the temperatures below which the solutions start to crystallize and cause difficulty in handling. This factor is important to the fertilizer manufacturer or applicator in the selection of the proper solution for the temperatures at which they are working. Solutions have been formulated with salting-out temperatures covering a range of —97 to 190° F.

Pressure Solutions

The salting-out temperatures of the ammonia-ammonium nitrate-water solutions in Table 3 range from —97 to 89° F. and a judicious selection of solution will permit a manufacturer to ammoniate during the coldest weather. Ammonia-ammonium nitrate-urea-water solutions also have a wide range of salting-out temperatures and the proper solution of this type can be selected for almost any temperature encountered during the manufacture of mixed fertilizers. Ammonia-urea-water solutions are formulated to cover a salting-out temperature range of 10-47° F.

The vapor pressures of these solutions predetermine the design working pressure of the ammoniation equipment for fertilizer plants. Low-pressure equipment can be used in most cases. Vapor pressures of solutions containing 25% or less of neutralizing ammonia do not exceed 25 lb. per sq. in. at 104° F. and only seven of the 67 pressure solutions have vapor pressures exceeding 75 lb. per sq. in. at this temperature.

The vapor pressure of these solutions is a deterrent to their use as direct application materials. The presence of the neutralizing ammonia necessitates sub-surface injection to avoid volatilization losses. Solutions 370(17-67-0), 410(22-65-0) and 410 (26-56-0) are examples of the pressure solutions used for sub-surface application. Solutions with higher vapor pressures have been used for direct application after dilution.

It has been customary to consider the vapor pressure at 104° F. in selecting a pressure solution for direct application. This temperature is higher than that usually encountered during the application of fertilizer so that vapor pressures below 104° F. might be considered in selecting pressure solutions for direct application. Care must be taken to select a solution that will not salt out before it reaches the soil.

Nonpressure Solutions

The solutions listed in Table 5 are formulated for use as surface-application materials and cannot be used to ammoniate superphosphate. The absence of neutralizing ammonia makes it possible to apply them on the surface of the soil without excessive loss of nitrogen.

Ammonium nitrate is the sole source of nitrogen in 11 of the solutions, urea in 3, and a mixture of the two materials in 5. Nitrogen is derived from ammonium nitrate and calcium nitrate in one solution and the only source of nitrogen in another solution is ammonium bisulfite.

The salting-out temperature is a critical factor in the selection of nonpressure solutions for direct application. When temperatures drop below the salting-out temperature of a solution, solids begin to crystallize, and cause uneven distribution and even clog equipment. Solution 280(0-40-30) would perform satisfactorily at much lower temperatures than any of the other solutions. A solution such as 245(0-70-0) probably would not be used for spring application in the northern part of the U.S. where temperatures tend to fall below the critical temperature.

This solution and the five listed solutions with salting-out temperatures over 100° F. would be purchased only by a manufacturer or distributor who had facilities to steam out a tank car after the solution had set. The removed liquid would be diluted and the resulting solution would be comparable to any other of similar concentration.

Nitrogen Solutions Production

Table 2 shows the number of nitrogen solutions manufactured by one or more producers. Solution 410(22-65-0) is the only solution manufactured by as many as 20 producers. Each one of 46 solutions is manufactured

TABLE 3. Properties of Pressure Solutions

Reference No.	Suggested nomenclature	Salting-out temperature	Vapor pressure (gauge) 60° F.	90° F.	104° F.	120° F.	Temperature at which gauge pressure is 0	Specific gravity at 60° F.	Weight of solution per gal. at 60° F.	Wt. of nitrogen per gal. of solution at 60° F.
		°F.	Psi.	Psi.	Psi.	Psi.	°F.		lb.	lb.
10	210(4- 0-38)	33	..	..	0	..	..	1.085	9.05	1.90
19	318(8-72- 0)	89	..	..	1	..	..	1.257	10.48	3.33
22	334(10-72- 0)	85	..	..	4	..	..	1.230[1]	10.26[1]	3.43[2]
24	340(19-54- 0)	12	..	..	1	..	..	1.118	9.32	3.19
25	370(13-53-16)[3]	36	0	0	0	3	108	1.235	10.30	3.80
26	370(17-67- 0)	50	— 9	— 3	2	7	101	1.184	9.87	3.66
27	370(25- 0-35)[4]	34	— 3	14	24	37	65	1.090	9.09	3.37
29	405(16-70- 6)	66	..	..	4	..	..	1.228	10.24	4.16
30	405(28- 0-38)[4]	34	4	28	31	46	50	1.070	8.92	3.61
31	410(19-58-11)	7	— 6	4	10	18	80	1.162	9.69	3.98
32	410(19-66- 5)	44	..	..	8	..	75	1.182	9.86	4.05
33	410(19-73- 0)	61	— 6	2	7	15	86	1.194	9.96	4.08
34	410(22-65- 0)	21	— 5	5	10	19	79	1.138	9.49	3.90
35	410(22-66- 0)	21	— 5	5	10	19	79	1.139	9.50	3.90
36	410(24-60- 0)	1	..	..	13	..	70	1.105	9.22	3.78
37	410(26-55- 0)	—23	..	..	16	..	67	1.077	8.98	3.68
38	410(26-56- 0)	—25	— 3	8	17	29	68	1.078	8.99	3.69
39	414(19-66- 6)	35	— 7	3	11	18	84	1.178	9.82	4.07
40	414(19-74- 0)	44	— 3	3	8	18	78	1.186	9.89	4.11
41	420(20-66- 6)	34	..	..	10	..	52	1.179	9.83	4.13
42	430(20-68- 6)	33	— 3	8	15	26	68	1.176	9.81	4.22
43	430(22-62- 7)	12	..	..	15	..	..	1.165	9.72	4.18
44	435(28-0-40-10)[5]	20	16	40	55	74	28	1.126	9.39	4.10
45	440(22-66- 6)	13	— 2	14	19	35	55	1.155	9.63	4.25
46	440(24-56-10)	—13	..	..	19	..	62	1.119	9.33	4.11
47	440(24-70- 0)	25	— 2	10	18	29	67	1.147	9.57	4.21
48	440(28-40-15)	1	3	18	28	45	52	1.052	8.77	3.86
49	440(28-60- 0)	—35	1	15	25	39	57	1.083	9.03	3.97
50	444(25-55-10)	—23	1	13	22	34	55	1.108	9.24	4.11
51	444(25-56-10)	—15	— 1	13	21	35	62	1.112	9.27	4.12
52	444(26-50-12)	— 7	1	15	25	37	54	1.083	9.03	4.03
53	448(25-69- 0)	6	0	9	17	29	61	1.124	9.37	4.20
54	450(25-69- 0)	1	0	13	23	35	61	1.133	9.45	4.25
55	450(26-68- 0)	2	..	..	22	..	60	1.129	9.42	4.24
56	450(26-69- 0)	6	0	13	22	34	60	1.129	9.42	4.25
57	450(27-50-12)	— 8	..	..	30	..	54	1.085	9.05	4.09
58	450(30- 0-43)	47	..	..	46	..	31	0.979	8.16	3.68
59	450(37- 0-32)	17	..	..	54	..	29	0.929	7.75	3.49
60	452(26-68- 0)	— 6	0	13	24	36	60	1.124	9.37	4.24
61	452(30-51- 6)	— 8	8	..	27	..	..	1.057	8.82	3.99
62	453(31- 0-43)	46	12	32	48	66	39	0.975	8.13	3.68
63	454(37- 0-33)	16	15	40	57	79	29	0.928	7.74	3.52
64	455(30- 0-43)[6]	34	16	40	55	74	28	1.064	8.87	4.02
65	465(32- 0-44)	40	22	..	63	..	..	0.97	8.09	3.76
66	465(32- 0-44)[7]	35	27	..	67	..	..	1.06	8.84	4.11
67	465(38- 0-33)	16	25	..	68	..	..	0.92	7.67	3.57
68	465(38- 0-33)[8]	10	30	..	77	..	..	0.99	8.26	3.84
69	470(30-65- 0)	—30	5	22	33	47	47	1.089	9.08	4.27
70	471(26-74- 0)	— 9	2	..	31	..	..	1.137	9.48	4.47
71	471(30-64- 0)	—32	5	21	29	45	48	1.096	9.14	4.30
72	480(33- 0-46)	31	18	45	58	..	..	0.972	8.11	3.89
73	480(39- 0-34)	10	27	54	75	..	..	0.922	7.69	3.69
74	490(33-43-13)	—26	..	..	54	..	..	1.020	8.51	4.18
75	490(33-45-13)	—14	12	35	50	71	34	1.033	8.62	4.22
76	490(33-55- 6)	—59	..	..	38	..	31	1.052	8.77	4.30
77	490(34-60- 0)	—51	10	32	49	71	39	1.045	8.72	4.27
78	495(37-40-11)	—50	..	..	60	..	..	1.039	8.67	4.29
79	499(32-68- 0)	[9]	12	..	50	..	..	1.074	8.96	4.47
80	500(40-50- 0)	—85	..	..	58	..	20	0.992	8.27	4.15
81	500(41- 0-36)	25	32	63	85	..	..	0.920	7.67	3.84
82	508(43-45- 0)	—97	24	53	72	99	6	0.984	8.21	4.17
83	510(35- 0-48)	45	31	61	80	..	..	0.969	8.08	4.12
84	515(40-40-10)	— 3	..	..	78	..	..	0.983	8.20	4.23
85	518(36-64- 0)	[9]	19	..	63	..	..	1.037	8.65	4.48
86	530(49-36- 0)	—96	38	76	103	138	—13	0.907	7.56	4.00
87	540(44-51- 0)	—60	29	64	85	118	14	0.966	8.06	4.35
88	585(50-50- 0)	[9]	44	..	144	..	..	0.930	7.76	4.54

[1]At 100° F.
[2]Contains 8.0% formaldehyde.
[3]Contains 8.4% carbon dioxide and 8.0% formaldehyde.
[4]Contains 8.5% carbon dioxide and 4.0% other material.
[5]Contains 9.2% carbon dioxide and 10.0% ammonium sulfate.
[6]Contains 10.0% carbon dioxide.
[7]Contains 8.0% carbon dioxide.
[8]Contains 5.5% carbon dioxide.
[9]Lower than —30° F.

[3]Anonymous—Essentially anhydrous ammoniating solutions introduced to industry; Com. Fert., 100(4):39-42 (1960).

"I always help the new men . . . put this bag out there."

TABLE 2. Number of Nitrogen Solutions Manufactured by One or More Producers

Solutions No.	Suggested nomenclature	Producers of each solution No.
1	410(22-65- 0)	20
1	490(34-60- 0)	19
2	410(26-56- 0); 471(30-64-0)	17
1	440(24-70- 0)	16
1	370(17-67- 0)	15
1	448(25-69- 0)	13
1	440(28-60- 0)	12
3	410(19-58-11); 414(19-74-0); 490(33-45-13)	11
3	440(22-66- 6); 440(28-40-15); 444(26-50-12)	10
2	320(0-44-35); 430(20-68-6)	9
5		7
3	410(19-73- 0); 414(19-66-6); 444(25-55-10)	6
6		5
2	200(0-57- 0); 470(30-65-0)	4
4		3
6		2
46		1
88		

by a single producer. It is interesting to note that only one nonpressure solution is produced by as many as nine producers. Table 2 indicates the wide-spread dispersion of production of certain solutions.

Summary

Twenty-four domestic and three Canadian manufacturers were producing 88 listed nitrogen solutions at 32 locations as of July 1, 1960. There were 67 ammoniacal or pressure solutions comprising 29 ammonia-ammonium nitrate-water, 17 ammonia-urea-water, and 21 ammonia-ammonium nitrate-urea-water solutions. Generally the pressure solutions are used to ammoniate superphosphate and mixtures containing superphosphate. Some of them have been used, as such or in diluted form, for direct application. There were 21 non-ammoniacal or nonpressure solutions being produced in 1960. These solutions contain no neutralizing ammonia and are used for direct application to the soil.

(Tables 4 and 5 on page 29)

California Fertilizer Conference in Discussion of N and Micronutrients

POMONA, CAL.—Topics covering the use of fertilizers in soil fertility and plant nutrition were well covered by speakers representing the University of California, the State Polytechnic College, and industry at the ninth annual California Fertilizer Conference March 27-28. The conference, conducted on the Kellogg-Voorhis campus of California State Polytechnic College, Pomona, was under the sponsorship of the Soil Improvement Committee of the California Fertilizer Assn.

Subjects featured at the conference were use of nitrogen and of micronutrients in the production of major California crops. George Park, vice president of Rocca-Cuvi, Inc., San Francisco, conference chairman, reported that unusual interest was apparent in the reports given by various scientists at the meeting.

The California farm labor problem came in for a considerable amount of discussion by speakers, including Jack T. Pickett, publisher of the "California Farmer" magazine, and John V. Newman, Ventura, president of the Council of California Growers.

It was pointed out in the discussions that a better public relations image is needed by farmers in the state, and that efforts to unionize the workers, particularly those from south of the border, have failed to help the situation.

The current reorganization of the California Department of Agriculture and its impact on the fertilizer industry were described by DeWitt Bishop, Sacramento, program supervisor, Inspection Service for Field Crops, Fertilizers and Agricultural Chemicals.

University and industry scientists presented papers describing new information developed concerning fertilizer use during the previous year. Dr. Roger Humbert, San Jose, Western director, American Potash Institute, reported that sugar is one crop not in surplus production—on the contrary, substantial quantities are imported. The Cuban situation is forcing changes in the U.S. sugar program which should mean increased domestic production. Beet sugar's share of U.S. production is expected to increase from 46% to 60% plus in the next 10 years. California and the West will figure in this expanded production and, since this crop is a heavy user of nitrogen, phosphate and potash, the fertilizer industry will benefit proportionately.

Drs. B. R. Krantz, James Cook, and Perry Stout, all of the University of California, Davis, presented featured papers on micronutrient deficiencies which reported on progress in their correction.

Haven Leavitt, Shell Development Co., Modesto, projected nitrogen's future in California agriculture. He reported a steady and rapid increase in its use between 1940, when 31,820 tons were applied, and 1959 which saw a use in California of 260,270 tons nitrogen.

Before 1925, the principal nitrogen materials available were a small amount of ammonium sulfate, tankage, blood meal, fish meal, guano, calcium nitrate and sodium nitrate. Ammonium sulfate became well established by 1930, and in 1934, anhydrous ammonia appeared on the scene as a fertilizing material. The 1940's saw a rapid expansion with increased use of established materials, and the appearance of urea, 16-20-0, 11-48-0, ammonium nitrate, ammoniated superphosphate, and aqua ammonia. In 1956, diammonium phosphate (21-53-0) was developed.

New products now entering the field include magnesium ammonium phosphate and ammonium chloride, he said. Development of improved placement of fertilizers is enhancing the efficiency of nitrogen utilization.

Discussions on micronutrients and on nitrogen were presented in two panels. Mordy S. Rose, vice president, J. F. Sloan Co., Salinas, was moderator of the micronutrient panel, which consisted of Randy Keim, Wilson & Geo. Meyer & Co., San Francisco; and Drs. Thomas Embleton, John Lingle, Carl Hansen, Kay Uriu, and James Cook—all of the University of California.

The nitrogen panel was moderated by R. L. Luckhardt, Collier Carbon and Chemical Corp., Los Angeles. Participating were Dr. William E. Martin, University of California, Davis; John Pryor, John Pryor Co., Salinas; J. W. Chapman, Fresno Agricultural Chemical Co., Fresno; D. W. Galbraith, Agriform Chemical Co., Woodland; and Howard H. Hawkins, Golden State Plant Food Co., Glendora.

Rolled up, tank takes little space... Unrolled, your truck quickly becomes a tank truck.

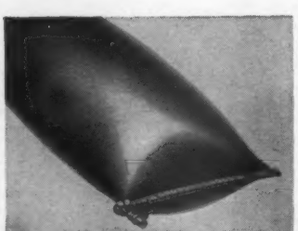
Use any truck to haul liquid fertilizer with Gates Fold-Away Tanks!

A Gates Fold-Away Tank can save you the expense of investing in a tank truck for hauling liquid fertilizer. With the new Gates Tank, your flatbed, stake or van truck can do the work of both a dry carrier and a tank truck.

It's a simple matter to unroll the Gates Fold-Away Tank on the bed of your truck and fasten it down securely with easy-to-use equipment available from Gates. Your truck is then ready to haul most commercial fertilizer solutions conveniently and safely.

Upon delivery of the liquid, you can quickly fold the tank and store it at one end of your truck bed. It takes up only a few cubic feet of space. Your truck can then be used to carry dry cargo on the return trip!

For complete information about the money-making benefits of using Gates Fold-Away Tanks, **write H. R. Berry, The Gates Rubber Co. Sales Div. Inc. Denver 17, Colorado.**



Special features of Gates Fold-Away Tanks

Six Sizes: 500 gal. to 3250 gal.

Cover: Tough and rugged... resists damaging effects of weather.

Reinforcement: High-strength plies of tire cord and woven fabric.

Lining: Rubber, highly resistant to corrosion.

Building the future on 50 years of progress

Gates

The Gates Rubber Company, Denver, Colorado BP19

Gates Fold-Away Tanks

Arcadian® News

Volume 6 | Nitrogen Division, Allied Chemical Corporation | Number 5

THE ADVANTAGES OF 20% SUPERPHOSPHATE IN MIXED FERTILIZERS

20% superphosphate is the key to the great progress which has been made in the manufacture of mixed fertilizers in this country. Manufacturers began to supply farmers with better fertilizers when industry research developed:

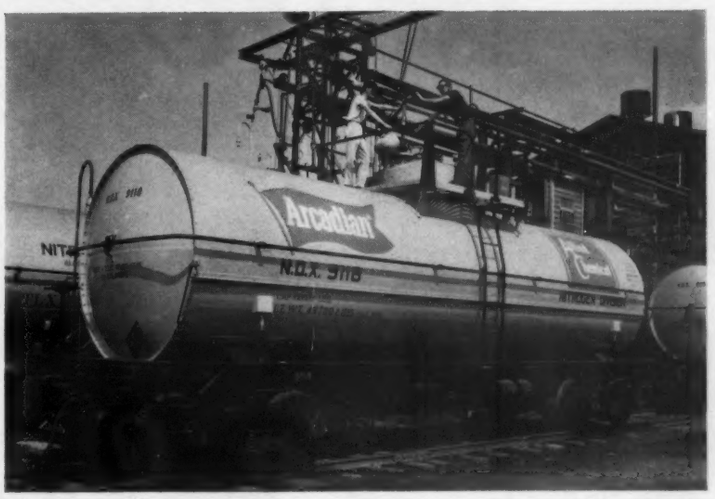
1. The production of 20% superphosphate by the acidulation of phosphate rock.
2. The production of nitrogen solutions for the ammoniation of 20% superphosphate to provide an economical base for mixed fertilizers.

20% superphosphate is the heart of a successful fertilizer technology which has supplied American farmers with millions of tons of efficient crop-producing power at low cost.

New gimmicks have come along for making fertilizers. New and more concentrated phosphorus carriers have been developed. But, no new method has been devised that will produce better quality fertilizers at lower cost than the technology which centers on the ammoniation of 20% superphosphate.

In the first place, 20% superphosphate has many basic advantages over other more concentrated phosphorus carriers. It is a lower cost source of phosphorus and it contains large quantities of gypsum (discussed elsewhere in this issue of ARCADIAN News).

20% superphosphate supplies phosphorus that remains in the soil available to plants over a longer period than phosphorus from more concentrated carriers which have a tendency to become fixed in the soil in compounds that cannot be used by plants.



Ammoniation of superphosphate has become the mainstay of the fertilizer industry since the creation of nitrogen solutions by Allied Chemical Corporation in 1929.

20% superphosphate will absorb more low-cost nitrogen through ammoniation with low-cost nitrogen solutions than will more concentrated phosphorus carriers. Low-cost 20% superphosphate and low-cost nitrogen solutions have enabled fertilizer manufacturers to supply farmers with low-cost, high-quality fertilizers.

Industry research with ammoniated superphosphate has helped in the improvement of the condition of all types of fertilizers and helped in the development of granular fertilizers.

As long as fertilizer manufacturers continue to make the largest possible utilization of 20% superphosphate and high levels of ammoniation, the situation favorable to the increased use of mixed fertilizers will exist and flourish.

Arcadian News for Fertilizer Manufacturers from Nitrogen Division, Allied Chemical

THE LOW COST WAY TO PUT N IN N-P-K

The most economical way to put nitrogen into mixed fertilizers is through the ammoniation of 20% superphosphate with nitrogen solutions. This tried and proven technique has been used with outstanding success by many manufacturers for many years.

Through the years, the technology of ammoniation has been constantly improved by the development of modern methods and the introduction of new types of ARCADIAN® Nitrogen Solutions. The result is more efficient production of better fertilizers.

Higher and higher levels of nitrogen take-up by superphosphate have been achieved. The standard rate at one time was 3 pounds of ammonia per unit of P_2O_5. Today it is common practice for one unit of P_2O_5 in 20% superphosphate to accommodate 5¾ to 6½ pounds of free ammonia, without the aid of acid or the loss of nitrogen. A big tonnage of good fertilizer is being made with ARCADIAN Nitrogen Solutions supplying 1 unit of nitrogen for each 2 units of P_2O_5.

Through the use of acid, much higher rates are obtained. Some fertilizer manufacturers use this practice to produce 10-10-10 fertilizer with all the nitrogen from solutions.

High take-up of free ammonia by superphosphate is usually desirable in the manufacture of any mixed fertilizers. It is particularly desirable in the production of granular fertilizers. A high rate of ammoniation not only adds large quantities of low-cost nitrogen, it also generates heat at an opportune time in granulation.

Ask Allied Chemical

Efficient ammoniation involves proper technique, equipment and materials. There is a complete line of ARCADIAN Nitrogen Solutions from which you can make selections adapted to your particular conditions.

Nitrogen Division technical men are experts in ammoniation. Their advice is free to customers. Contact: Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y.

Ammoniated Superphosphate Contains **Four** Plant Foods

You ammoniate 20% superphosphate to put nitrogen and phosphorus in your fertilizer. But, don't forget, you also include large quantities of sulphur and calcium. In fact, 20% superphosphate contains more sulphur and more calcium than phosphorus.

Other more concentrated sources of phosphorus, such as triple superphosphate and ammonium phosphate, are deficient in calcium and sulphur because the gypsum has been removed.

It will pay you to tell farmers about the two bonus plant foods they get in your mixed fertilizers made with 20% superphosphate. For every unit of phosphorus in 20% superphosphate, you give the farmer 137 pounds of gypsum (calcium sulphate).

Both the calcium and the sulphur in gypsum are valuable plant foods. In addition, gypsum is an excellent soil conditioner, widely used to improve water penetration in tight soils. Farmers use hundreds of thousands of tons of gypsum each year in addition to the gypsum they get in superphosphate.

You charge your customers for the nitrogen, phosphoric acid and potash in your mixed fertilizer. When you use ammoniated superphosphate, you also give them calcium, sulphur and a soil conditioner at no extra cost except for transportation.

The value of calcium in fertilizer is well known. Calcium is an essential plant food. It also helps to counteract the effect of low pH. Many crops grow well at a low pH when they have an adequate supply of calcium from gypsum.

The value of sulphur in fertilizer is demonstrated by the fact that crops, on the average, remove about as much sulphur from the soil as they do phosphorus. Yet the average soil contains only half as much sulphur as phosphorus.

With the increase in the use of sulphur-deficient triple superphosphate and ammonium phosphate in concentrated fertilizers, much land gets little sulphur. The lack of this secondary plant food element is more and more apt to limit crop yields and profits.

Critical Sulphur Shortage

The shortage of sulphur is becoming critical for many crops on many soils. Cotton, corn, tobacco, legumes, grass, onions and cabbage are heavy users of sulphur. Field tests in many areas now show definite response of crops to additional sulphur.

Symptoms of sulphur deficiency appear in corn and other crops as pale green leaves, not to be confused with the drying up of older, lower leaves, typical in nitrogen deficiency. Sulphur is needed to produce the essential amino acids that go into making the protein of plant cells.

Sulphur is required for good nodule formation on legume roots. With cotton, lack of sulphur reduces number of bolls matured, rate of growth and yield of seed cotton. On an elemental basis, the

Cotton is a heavy user of sulphur. So are corn, legumes, onions and cabbage. Many soils are running out of sulphur fast!

corn plant actually uses as much sulphur as it does phosphorus. A 100-bushel crop requires 160 pounds of nitrogen, 25 pounds of elemental phosphorus, 100 pounds of potassium, and 25 pounds of sulphur.

Sulphur leaches out of the soil almost as fast as potash or calcium, and it needs to be applied frequently. In the past, sulphur requirements of plants have been largely ignored because most fertilizers have carried substantial amounts of sulphur along with nitrogen, phosphorus and potash.

All of the available evidence builds up an impressive case for continuing to supply sulphur in mixed fertilizers. When you ammoniate superphosphate for your mixed fertilizers, you are giving farmers a bargain in free sulphur, calcium and soil conditioner. You and your dealers will benefit by telling farmers about these bonus values.

PLEASE DO NOT HOLD TANK CARS TOO LONG

Nitrogen Division, Allied Chemical Corporation, is doing its utmost to keep its delivery facilities operating at top efficiency during this period of peak demand for nitrogen. Extra effort is being exerted to keep tank cars rolling to your plant to supply you with ARCADIAN® Nitrogen Solutions when you want them.

The only thing that can interfere with this service is a shortage of tank cars. Despite the fact that Nitrogen Division is operating more tank cars than ever before, if too many fertilizer manufacturers hold too many tank cars too long, a shortage may cause slow deliveries.

You can cooperate by returning empty tank cars as quickly as possible. A tank car sitting idle on your siding—or anyone else's—can't also be back at the nitrogen plant taking on that rush order you just placed. So unload tank cars as fast as you can and return them.

You cannot mix and ship tonnage on schedule if you are waiting for nitrogen solutions. And Nitrogen Division, Allied Chemical Corporation, cannot ship solutions on schedule if tank cars are not available. Don't hold tank cars! Keep 'em rolling to serve you!

Complete Fertilizer Service Builds Exclusive Customers

Everyone who sells fertilizers wants plenty of exclusive customers. The best way to build customer loyalty is to be prepared to supply all of the mixed goods analyses and straight materials the farmer needs and wants. You are in danger of losing a customer when you provide only part of his plant food needs and force him to go elsewhere to buy what you do not sell.

You can't help but benefit when your customers make you their headquarters for all their fertilizer requirements. It pays to establish your prestige and your leadership as a dependable, one-stop, full-line source of supply.

You will find it profitable to study market trends so that you can anticipate demands and be prepared to supply these demands. Three important trends are now evident in fertilizer consumption figures: **1.** The growth in the use of high-nitrogen fertilizers. **2.** The fact that more nitrogen is sold as straight materials than in mixed fertilizers. **3.** The rapid increase in the use of nitrogen solutions for direct application.

Experiment Stations are recommending more and more nitrogen for crops. Corn and several other major crops require more nitrogen than any other plant food. More and more farmers are testing their soils and they know their needs.

For many crops and soils, farmers have found that it pays to use more than one application of nitrogen. They apply part of their nitrogen in mixed fertilizers and part of it in one or more separate applications of straight material.

Sell straight nitrogen materials along with your mixed fertilizers and you increase your sales and your profits. There was a time when straight nitrogen materials did not offer an attractive profit margin to fertilizer manufacturers. But the situation is different today, particularly in the case of ARCADIAN® Nitrogen Solutions for direct application.

Some fertilizer manufacturers are finding that they make bigger profits from ARCADIAN Golden URAN®, ARCADIAN FERAN® and ARCADIAN NITRANA® than they make from mixed fertilizers.

When you sell ARCADIAN nitrogen materials (liquid and dry) for direct application, you help farmers to get better yields and insure that response to your mixed fertilizers will not be limited by lack of nitrogen. You sell a bigger tonnage of plant food and you build farmers into exclusive customers for you and your dealers.

You will find it profitable to let Nitrogen Division, Allied Chemical, work with you in helping you to offer your customers a complete line of mixed fertilizers and straight nitrogen materials.

Many different ARCADIAN Nitrogen Solutions are available for the manufacture of every mixed fertilizer analysis now in demand. Many different ARCADIAN Nitrogen Products (liquid and dry) are also available to sell to farmers for direct application.

Start now to make ARCADIAN Nitrogen a sales builder for you. Contact: Nitrogen Division, Allied Chemical Corporation, 40 Rector Street, New York 6, N. Y. Phone: HAnover 2-7300.

Arcadian® NITROGEN SOLUTIONS

	CHEMICAL COMPOSITION %						PHYSICAL PROPERTIES		
	Total Nitrogen	Anhydrous Ammonia	Ammonium Nitrate	Urea	Water	Neutralizing Ammonia Per Unit of Total N (lbs.)	Approx. Sp. Grav. at 60° F	Approx. Vap. Press. at 104° F per Sq. In. Gauge	Approx. Temp. at Which Salt Begins to Crystallize °F
NITRANA®									
2	41.0	22.2	65.0	—	12.8	10.8	1.137	10	21
2M	44.0	23.8	69.8	—	6.4	10.8	1.147	18	15
3	41.0	26.3	55.5	—	18.2	12.8	1.079	17	-25
3M	44.0	28.0	60.0	—	12.0	12.7	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	12.6	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	8.9	1.184	1	56
4M	41.0	19.0	72.5	—	8.5	9.2	1.194	7	61
6	49.0	34.0	60.0	—	6.0	13.9	1.050	48	-52
7	45.0	25.3	69.2	—	5.5	11.2	1.134	22	1
URANA®									
6C	43.0	20.0	68.0	6.0	6.0	9.3	1.180	12	39
6M	44.0	22.0	66.0	6.0	6.0	10.0	1.158	17	14
10	44.4	24.5	56.0	10.0	9.5	11.0	1.114	22	-15
11	41.0	19.0	58.0	11.0	12.0	9.2	1.162	10	7
12	44.4	26.0	50.0	12.0	12.0	11.7	1.087	25	- 7
13	49.0	33.0	45.1	13.0	8.9	13.5	1.033	51	-17
DURANA®									
DURANA contains 8% formaldehyde.	37.0	13.3	53.4	15.9	9.4	7.2	1.235	0	36
U-A-S®									
A	45.4	36.8	—	32.5	30.7	16.2	0.932	57	16
B	45.3	30.6	—	43.1	26.3	13.5	0.978	48	46
[illegible]	82.2	99.9	—	—	—	24.3	0.618	211	-108

Other ARCADIAN® Products: URAN® and FERAN® Solutions • Ammonia Liquor • N-dure® A-N-L® • Ammonium Nitrate • UREA 45 • Nitrate of Soda • Sulphate of Ammonia

When you purchase your nitrogen requirements from Nitrogen Division, Allied Chemical, you have many different nitrogen solutions from which to select those best suited to your ammoniation methods and equipment. You are served by America's leading producer of the most complete line of nitrogen products on the market. You get formulation assistance and technical help on manufacturing problems from the Nitrogen Division technical service staff. You benefit from millions of tons of nitrogen experience and the enterprising research that originated and developed nitrogen solutions.

NITROGEN DIVISION

MAIN OFFICE: 40 RECTOR ST., NEW YORK 6, N. Y., PHONE HANOVER 2-7300

Allied Chemical

Hopewell, Va., P. O. Drawer 131.....Glenview 8-6301
Ironton, Ohio, P. O. Box 98.....Drexel 7-4366
Omaha 7, Neb., P. O. Box 166.....29 1-1464
Raleigh, N. C., 606 Capital Club Bldg.....Temple 3-2801
Columbia 1, S. C., 1203 Gervais St.....Alpine 3-6676
Atlanta 3, Ga., 127 Peachtree St., N. E...Jackson 2-7805
Memphis 9, Tenn., 1929-B South 3rd St. Whitehall 8-2692
Indianapolis 20, Ind., 6060 College Ave. ..Clifford 5-5443
San Francisco 4, Cal., 235 Montgomery St...Yukon 2-6840

TABLE 4. Nitrogen Solutions: Producers, Plant Locations and Types of Solution Produced, July 1, 1960

Producer	Plant location	Solutions containing—Ammonia and—Ammonium nitrate	Urea	Ammonium nitrate and urea	No ammonia
Allied Chemical Corp.	Hopewell, Va.; La Platte, Neb.; South Point, Ohio	X	X	X	X
American Cyanamid Co.	Port Robinson, Ontario, Canada	X	X	X	X
Armour Agricultural Chemical Co.	Crystal City, Mo.	X			
California Chemical Co.	Richmond, Cal.	X			X
Calumet Nitrogen Products Co.[1]	Hammond, Ind.	X		X	
Canadian Industries, Ltd.	Beloeil, Province of Quebec, Canada	X			
Collier Carbon & Chemical Corp.	Brea, Cal.	X			X
Commercial Solvents Corp.	Sterlington, La.	X		X	
The Consolidated Mining and Smelting Co. of Canada, Ltd.	Trail, B.C., Canada				X
Cooperative Farm Chemicals Assn.	Lawrence, Kansas	X			X
Deere and Co.	Pryor, Okla.		X		
E. I. du Pont de Nemours & Co.	Belle, W. Va.		X		
Escambia Chemical Corp.[2]	Pensacola, Fla.	X		X	X
Florida Nitrogen Co.	Tampa, Fla.	X			X
W. R. Grace & Co.	Memphis, Tenn.		X		X
Hercules Powder Co.	Hercules, Cal.	X			X
Ketona Chemical Corp.	Ketona, Ala.	X		X	
Mississippi Chemical Corp.[3]	Yazoo City, Miss.	X	X	X	X
Monsanto Chemical Co.	El Dorado, Ark.; Luling, La.	X		X	X
Northern Chemical Industries, Inc.	Searsport, Maine	X		X	
Phillips Chemical Co.	Etter, Texas	X		X	
St. Paul Ammonia Products, Inc.	Pine Bend, Minn.	X			
Solar Nitrogen Chemicals, Inc.[4]	Lima, Ohio	X	X	X	X
Southern Nitrogen Co., Inc.	Savannah, Ga.	X	X	X	X
Spencer Chemical Co.	Pittsburg, Kansas; W. Henderson, Ky.; Vicksburg, Miss.	X	X	X	X
Texaco, Inc.	Lockport, Ill.	X		X	
U. S. Industrial Chemicals Co.	Tuscola, Ill.	X		X	X

[1]Production marketed by Sinclair Petrochemicals, Inc., Chicago, Ill., and New York, N.Y., and by Standard Oil Co. (Indiana), Chicago, Ill.
[2]Production marketed by Ashcraft-Wilkinson Co., Atlanta, Ga.
[3]Production marketed in part by Coastal Chemical Corp., Pascagoula, Miss.
[4]Production marketed by Sohio Chemical Co., Lima, Ohio.

TABLE 5. Properties of Nonpressure Solutions

Reference No.	Suggested nomenclature	Salting-out temperature	Specific gravity at 60° F.	Weight of solution per gal. at 60° F.	Wt. of nitrogen per gal. of solution at 60° F.
		°F.		lb.	lb.
1	85(0-0-0-60)[1]	32	1.280	10.68	0.91
2	160(0-46- 0)	11	1.207	10.07	1.61
3	170(0-31- 0-36)[2]	32	1.499[3]	12.50[4]	2.13[4]
4	170(0-49- 0)	16	1.222	10.19	1.73
5	175(0-50- 0)	22	1.231	10.27	1.81
6	180(0-51- 0)	23	1.235	10.30	1.85
7	190(0-54- 0)	33	1.253	10.45	1.99
8	200(0-57- 0)	41	1.264	10.54	2.11
9	210(0-60- 0)	49	1.286	10.73	2.25
11	228(0-65- 0)	65	1.307	10.90	2.49
12	245(0-70- 0)	86	1.346[5]	11.23[5]	2.76[5]
13	280(0-39-31)	— 1	1.279	10.67	3.00
14	280(0-40-30)	— 1	1.283	10.70	3.00
15	280(0-80- 0)	136	1.360[6]	11.34[7]	3.18[7]
16	290(0-83- 0)	154	1.380[8]	11.51[7]	3.34[7]
17	300(0-42-33)	15	1.301	10.85	3.27
18	315(0- 0-68)[9]	135	1.170[9]	9.76[9]	3.07[9]
20	320(0-44-35)	32	1.327	11.07	3.55
21	320(0-45-35)	32	1.326	11.05	3.55
23	338(0- 0-72)[9]	155	1.18[10]	9.84[10]	3.33[10]
28	376(0- 0-80)	190	1.19[11]	9.92	3.73

[1]Estimated to contain substantially 60% ammonium bisulfite.
[2]Contains 36.2% calcium nitrate.
[3]At 68° F./60° F.
[4]At 68° F.
[5]At 70° F.
[6]At 158° F./60° F.
[7]At 158° F.
[8]Contains 3.0% biuret.
[9]At 140° F.
[10]At 160° F.
[11]At 194° F.

Chemical Sales Credited For 1960 Grace Profit Rise

NEW YORK—W. R. Grace & Co. reported consolidated net income of $16,220,000 for 1960 compared with $16,466,000 for 1959 in its recent annual report to stockholders.

The most significant feature of 1960 operations, the report said, was the marked rise in chemical sales and earnings for the third consecutive year. Chemical earnings rose 11% and accounted for 76% of total company earnings. Chemical sales of $229,414,100, were 9% ahead of 1959, representing 42% of total sales and revenues.

The report also noted losses suffered due to the expropriation of a paper converting plant in Cuba.

New Phosphate Facility Under Way in Algeria

ALGERIA—Construction has started on the $25 million Djebel-Onk phosphate works in northeastern Algeria. Total reserves are estimated at 500 million tons, one-fifth of which is in open pits. By the end of 1962, the enterprise will have turned out its first 50,000 tons of 75% phosphate content. In 1964, production will hit full stride at 800,000 tons a year.

The Société d'Exploitation du Gisement de Phosphate de Chaux du Djebel-Onk, jointly owned by the state and private interests, will mine the deposits. Major shareholder is Compagnie des Phosphates de Constantine, with 40% of the new firm's $6 million capital; the French government holds 34% through two agencies. Most of the remaining shares are held by Algerian development groups.

The raw ore, no richer than 50% in content, will be treated through to the roasting process at Djebel-Onk and taken to Bône on the Mediterranean, 210 miles north, to be washed, dried and readied for shipment. The treatment plants will cost $8 million and laying an electrified rail line from Djebel-Onk to Tebessa a further $9 million.

Union Oil Co. Buys Pacific Chemical Assets

LOS ANGELES—Union Oil Co. of California recently purchased assets of the Pacific Chemical & Fertilizer Co., a Hawaiian corporation in the process of liquidation, according to Reese H. Taylor, chairman. The amount paid was reported to be approximately $6.5 million.

Assets purchased include 10.4 acres in the industrial area of Honolulu and the Pacific Guano Co., a wholly-owned California subsidiary of Pacific Chemical & Fertilizer Co.

Pacific Guano, a marketer of petrochemicals on the West Coast, will operate independently, with ownership vested in Union's subsidiary, Collier Carbon and Chemical Corp.

The Hawaiian real estate is adjacent to Union Oil's marketing terminal at Honolulu.

Massachusetts Names New Dean of College

AMHERST, MASS.—Dr. Arless A. Spielman, Connecticut educator and researcher, has been named Dean of the College of Agriculture at the University of Massachusetts, it was announced by Pres. John W. Lederle.

Dr. Spielman, presently associate director of the Agricultural Experiment Station at the University of Connecticut, will also serve as director of the Massachusetts Experiment Station and director of the cooperative extension service.

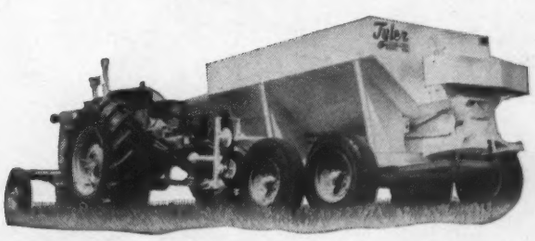
TYLER *Leads the Way in*

FERTILIZER SPREADING

a sensational

BREAK-THROUGH

in design and engineering!



DO-IT-YOURSELF

fertilizing equipment which you can rent to your customers . . . spreads up to an acre per minute.

- Hauls and spreads fertilizer quickly and efficiently
- 45-foot spread pattern
- Investment in this machine will move up to 600% more fertilizer

distributor inquiries welcome!

also a complete line of truck bulk spreaders

SPECIFICATIONS
Body Weight 1500 lbs.
Hopper Dimensions 60" x 84"
Wheel Track 74 inches
Capacity 2½ Ton
Spread Pattern Approx. 45 ft.
Spread Cap. per hr. 30-60 Acres
Highway Speeds up to 60 M.P.H.

Tyler

Phone Vlking 2-8581
MANUFACTURING COMPANY
East Highway 12 Benson, Minn.

INDUSTRY PERSONNEL NEWS

Niagara Announces Personnel Changes

MIDDLEPORT, N.Y.—Niagara Chemical Division of Food Machinery and Chemical Corp. has announced two new appointments at its headquarters plant in Middleport, N.Y. Nelson Darroch takes the post of technical assistant to the production manager while Richard R. Heinze replaces him as chief chemist in quality control.

Mr. Darroch has been with Niagara since 1958, serving in quality control until his new appointment in production. Previously he was with Frontier Oil Refinery Division of Ashland Oil Corp. at Tonawanda, N.Y., and before that was a research technician with the Electrochemical Division of Union Carbide at Niagara Falls, N.Y. He also was a medical laboratory technician in the Air Force for four years.

Richard R. Heinze, newly named chief quality control chemist at the Middleport plant, joins Niagara after service with Olin Mathieson Chemical Corp. at Niagara Falls, N.Y., where he researched chemicals for new end uses. A graduate of Hobart College in 1950, with a B.S. degree in chemistry, he also did graduate study at the University of Michigan.

Niagara has also announced the appointments of four midwestern sales representatives recently added to the Niagara staff. The men, and principal areas they will serve, are: Kenneth M. Harrison, southwestern Indiana and western Kentucky; Robert T. Morgan, northern Indiana; Robert D. Shockey, southeastern Indiana and central Kentucky; and E. Dean Wolfe, Nebraska.

Mr. Harrison served the Ohio County Board of Education at Hartford, Kentucky, as a teacher of vocational agriculture prior to joining Niagara. He holds B.S. and M.S. degrees from the University of Kentucky.

Robert Morgan joins Niagara after serving as an assistant county agent in Daviess County, Indiana, for two years. He was graduated from Purdue University in 1938.

Robert Shockey, who will assist the territory manager in servicing growers in Indiana and Kentucky, was with the Oxford Paper Co. before taking this new post.

Mr. Wolfe formerly operated the Wayne Feed Store at Lexington, Neb., for some seven years.

New Geigy Vice President

ARDSLEY, N.Y.—Conrad G. Hurlimann has joined Geigy Chemical Corp. as vice president and director, Charles A. Suter, executive vice president, has announced. Mr. Hurlimann will assist at the planning and management level in the company's general expansion and growth.

Conrad G. Hurlimann

Before his affiliation with Geigy, Mr. Hurlimann was, for several years, administrative vice president and director of Pfizer International, Inc.

Geigy manufactures agricultural chemicals, and is credited with the discovery of DDT. The firm celebrated its two hundredth anniversary in 1958.

●

To New Marketing Post

LOS ANGELES—Dr. A. L. McCloskey has been appointed to the newly-created position of associate director of market development and technical service of U. S. Borax & Chemical Corp., according to J. F. Corkill, vice president in charge of marketing.

Dr. A. L. McCloskey

Dr. McCloskey was formerly associate director of chemical research of U. S. Borax Research Corp., Anaheim, Cal. He assumed his new duties in the New York office of U. S. Borax April 15.

Following service in the navy, Dr. McCloskey attended Whittier College and later the University of Wisconsin where he received a Ph.D. degree in chemistry. Upon completion of his graduate work, he was employed as an instructor at the University of California at Los Angeles, and the University of Pennsylvania. In 1955, he joined U. S. Borax Research Corp.

●

Raymond Bag Appoints

MIDDLETOWN, OHIO—Raymond Bag Corp. has announced the appointment of Al P. Wolff as a representative of the firm. He will be associated with Raymond's New York City sales office.

Al P. Wolff

The new appointee will contact accounts in the New York metropolitan area, but in addition to this, will also be making calls in the area outside New York proper, according to the announcement.

●

Amoco Chemicals Names Three to New Positions

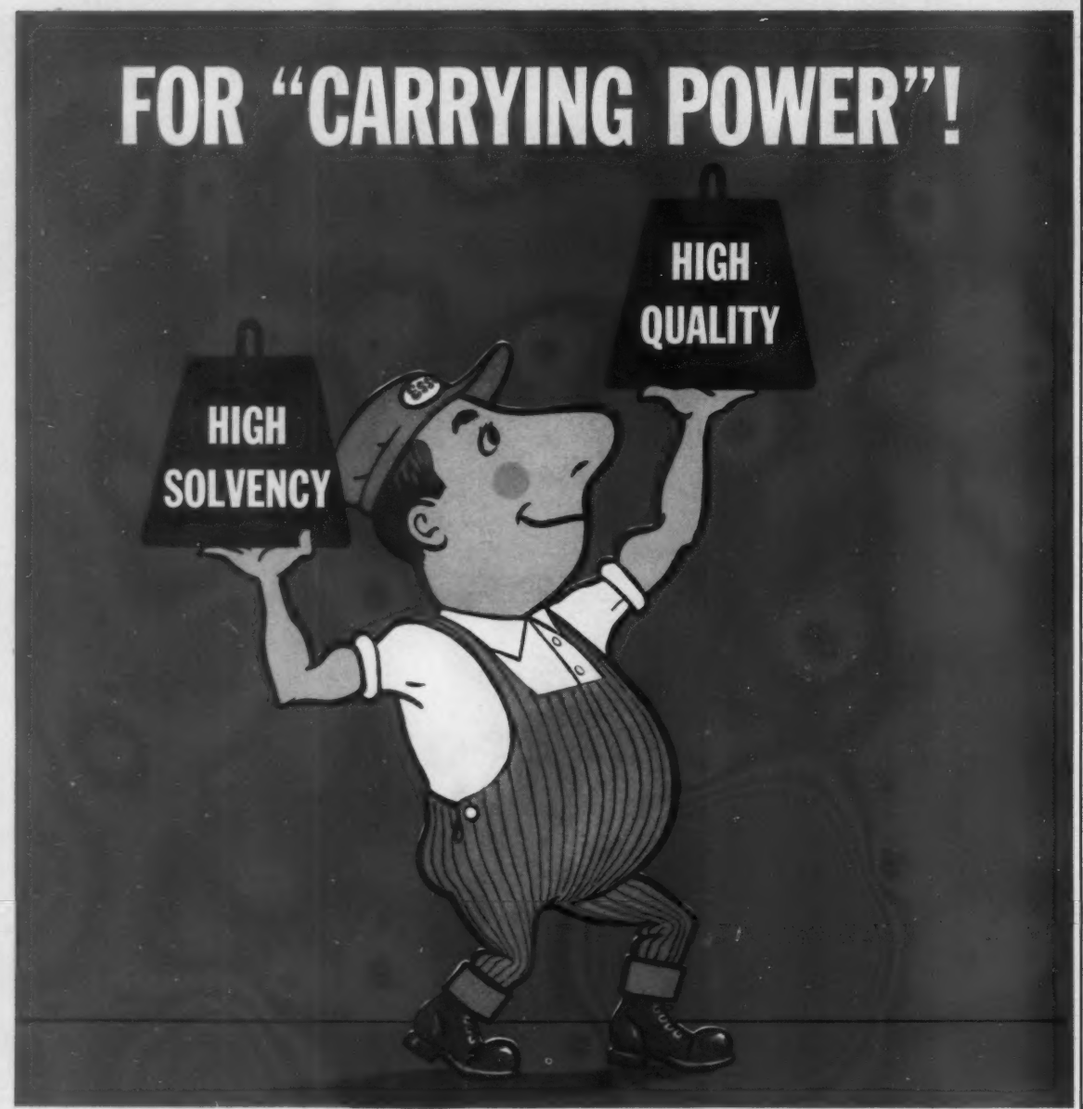
CHICAGO — Amoco Chemicals Corp. has announced three personnel changes recently, involving the appointment of a new member of the board of directors, new general sales manager, and new manager of supply and transportation.

Grant A. Brown, who joined Amoco April 1 as general counsel, has been named a member of the company's board of directors. The announcement was made by Jay H. Forrester, president.

Before joining Amoco, Mr. Brown was general counsel and a director of Utah Oil Refining Co. in Salt Lake City.

J. G. Lambertsen has been made

FOR "CARRYING POWER"!



HAN® for improved pesticides and herbicides

This uniform Esso solvent is a heavy aromatic naphtha, which gives you the "carrying power" necessary for the formulation of high quality pesticides and herbicides. Compatible with active ingredients, HAN lets you incorporate maximum quantities of toxicants in your concentrate, helping to insure the uniformity of your end product.

AROMIN 85 is also available for use in pesticides and herbicides where higher volatility is required, and the very minimum phytotoxicity with aromatics. Technical assistance from the Esso Sales Service Laboratories is yours for the asking. Call your Esso Representative or write to us at 15 West 51st Street, New York 19, New York.

ESSO STANDARD, DIVISION OF
HUMBLE OIL & REFINING COMPANY
Esso

general sales manager of industrial chemicals, according to L. G. Parkinson, general manager, marketing. Mr. Lambertsen has been manager of supply and transportation since Amoco Chemicals was formed in 1957. He is a graduate of the University of Michigan.

James Zisson was appointed manager of supply and transportation to succeed Mr. Lambertsen. The announcement was made by L. L. Smith, general manager, manufacturing. Mr. Zisson has been assistant manager for the past three years. He is a graduate from Northeastern University, Boston, and also holds a degree from Boston University.

●

B. L. How to New Post

MEMPHIS, TENN.—W. R. Grace & Co., Nitrogen Products Division, has announced the appointment of Burton L. How, Jr. as Chicago district sales manager with offices at 75 East Wacker Drive.

Burton L. How

Mr. How was formerly anhydrous ammonia product manager at the Nitrogen Products Division headquarters in Memphis, Tenn. He joined W. R. Grace & Co. in 1953 and was for two years in the New York office before moving to Memphis in 1955 when Grace's ammonia and urea facilities came into production.

As Chicago district sales manager, he will be responsible for ammonia and urea fertilizer and feed urea sales in the states of North Dakota, South Dakota, Nebraska, Iowa, Minnesota, Wisconsin, Michigan, Ohio, and the northern half of Illinois and Indiana.

●

IMC Advances C. J. Anstrand

SKOKIE, ILL.—C. J. Anstrand, sales manager of the industrial chemicals department of International Minerals & Chemical Corporation, has been promoted to staff assistant to the vice president of IMC's technical division.

Succeeding Mr. Anstrand as industrial chemicals sales manager will be Paul H. Hiller, manager of IMC's corporate office in New York City. Mr. Hiller has been associated with industrial potassium chemicals since the start of their production in the United States. He will continue to headquarter in New York City.

Mr. Anstrand joined IMC in 1943, and was named industrial chemicals sales manager in 1948.

●

J. E. Van Stone R. S. Schuba

Hewitt-Robins Names Two

STAMFORD, CONN.—Hewitt-Robins Co., Stamford, has announced the appointments of two district managers. J. E. Van Stone has been made Cleveland district manager, and R. S. Schuba, Detroit district manager. Mr. Van Stone will be responsible for marketing the firm's line of conveyor machinery, power transmission equipment and other industrial products in much of Ohio.

Mr. Schuba will be responsible for sales in most of Michigan and northern Indiana.

Joins Western Firm

PORTLAND, ORE.—Paul Beddoe has recently joined the agricultural chemical department of Great Western Chemical Co., according to an announcement by Lee Hansen, manager of the agricultural chemical department. Mr. Beddoe is located in Medford, Ore., where Great Western has a warehouse and office for distribution and sales of agricultural and industrial chemicals in the southern Oregon and northern California markets.

Paul Beddoe

Formerly, Mr. Beddoe was employed by the Bear Creek Orchards of Medford, Ore. Mr. Beddoe is a graduate in horticulture from Washington State University. Great Western Chemical Co. recently opened a new warehouse and office in Medford to serve the southern Oregon and northern California agricultural and industrial chemical trade.

●

Joins Pesticide Firm

KANSAS CITY — Great Lakes Chemical Corp. has announced that Marshall M. Manns has joined its organization as manager of agricultural chemical sales. His duties will cover not only the sales of Great Lakes' agricultural chemicals but also technical service to Great Lakes' customers. In addition, Mr. Manns will be responsible for sales of technical chemicals to be used in agricultural formulations.

During the 23 years prior to joining Great Lakes, Mr. Manns has been associated with the application and sale of agricultural chemicals. In recent years, his activity has centered on control of insects in stored grain.

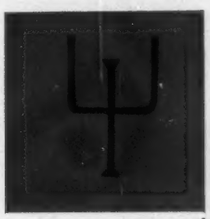
Arizona Firm Appointee

PHOENIX, ARIZ.—Dr. John E. Chilton has been named director of research and development for Arizona Fertilizer & Chemical Co., Phoenix.

Dr. John E. Chilton

The announcement was made by Frank M. Feffer, Sr., president, who said that Dr. Chilton will coordinate the services and activities of the company's technical department. Dr. Chilton received his doctorate in plant pathology from Iowa State University and has been with Arizona Fertilizer & Chemical Co. since 1957 as plant pathologist. His activities have been in herbicide development, in addition to plant disease control. He

SYMBOLS OF PLANT LIFE



During the centuries of medieval persecution and the attempted suppression of learning, every alchemist invented his own secret symbols even in experimenting with potash.

*

TODAY, THERE IS NO SECRET ABOUT THE ESSENTIAL ROLE POTASH PLAYS IN MIXED FERTILIZERS . . . HOW IT CONTRIBUTES TO THE PRODUCTION OF QUALITY CROPS.

SOUTHWEST POTASH CORPORATION PROVIDES MIXERS WITH A DEPENDABLE SUPPLY OF HIGH $K_{T.M.}$ MURIATE . . . STANDARD, COARSE AND GRANULAR . . . FOR THE PLANT FOOD INDUSTRY.

15th Century Alchemy process

SOUTHWEST POTASH CORPORATION

1270 Avenue of the Americas, New York 20, N.Y.

HIGH-K

*Another 15th Century Symbol for Potash

has also actively worked in the improvement of range lands and watersheds.

●

Heads Agri-Chem Sales

LOS ANGELES — Collier Carbon and Chemical Corp. has announced the appointment of John A. Foster as general manager of agricultural chemical sales. He was previously supervisor of sales development at Collier. Mr. Foster replaces R. H. McGough who has been elected president of the Western States Chemical Corp. Mr. Foster, a veteran chemical fertilizer marketing executive, is a graduate of the University of Washington with a B.A. degree in economics and business.

John A. Foster

●

Made Assistant Secretary

LOS ANGELES—The election of Benjamin R. Pickering as assistant secretary of U. S. Borax & Chemical Corp. has been anounced by Hugo Riemer, company president.

Mr. Pickering has been with U. S. Borax and its predecessor company, U. S. Potash, since 1951—serving in various sales executive capacities. His most recent post was that of market research manager in the marketing department.

As assistant secretary of the corporation, he will be located in the New York office.

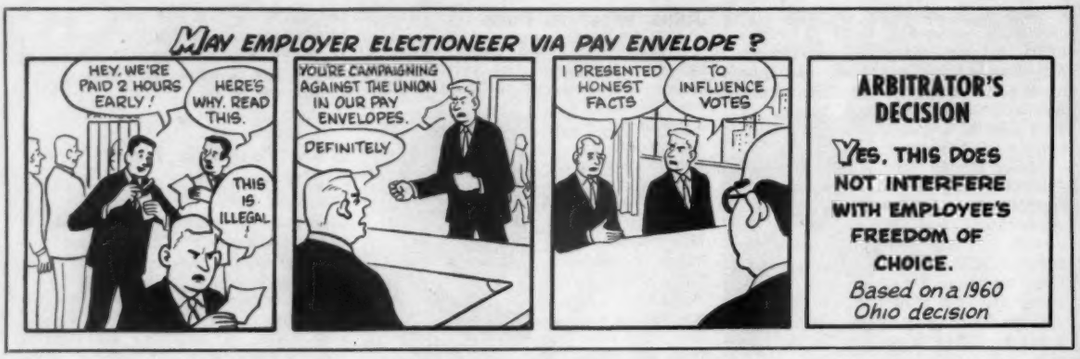
Born in Lincoln, Neb., Mr. Pickering received an A.B. in economics from the University of Nebraska in 1949 and also did graduate work at New York University.

●

New General Manager

MILWAUKEE — Appointment of Roy M. Casper as general manager, Power Equipment Division, effective May 1, has been announced by Allis-Chalmers. He succeeds J. W. McMullen, who retired after 45 years of service with the company.

Mr. Casper, a vice president of the company, joined Allis-Chalmers in 1936 as a sales representative in the Detroit office..


MAY EMPLOYER ELECTIONEER VIA PAY ENVELOPE ?
HEY, WE'RE PAID 2 HOURS EARLY!
HERE'S WHY. READ THIS.
THIS IS ILLEGAL!
YOU'RE CAMPAIGNING AGAINST THE UNION IN OUR PAY ENVELOPES.
DEFINITELY
I PRESENTED HONEST FACTS
TO INFLUENCE VOTES
ARBITRATOR'S DECISION
YES, THIS DOES NOT INTERFERE WITH EMPLOYEE'S FREEDOM OF CHOICE.
Based on a 1960 Ohio decision

Elton Conveyors
Built to . . .
Last You LONGER
Save You MORE!
THE CHANTLAND CO.
HUMBOLDT, IOWA

Assistant Ad Manager

LIBERTYVILLE, ILL. — Appointment of John C. Miller as assistant to the advertising manager of The Frank G. Hough Co., Libertyville, Ill., has been announced by Madison L. Crawford, manager of advertising and sales promotion for the company.

John C. Miller

Mr. Miller, a native of England, served for a number of years with Odeon Theatres, a wholly-owned subsidiary of the J. Arthur Rank Organization. He migrated to Canada in 1954 and, during his residency in that country, was active in advertising activities in Toronto.

The Hough firm manufactures the "Payloader" line of front end loaders widely used in the fertilizer industry.

●

New Board Member

FALLS CHURCH, VA.—Dr. Lloyd W. Hazleton, president of Hazleton Laboratories, Inc., has announced that Roland Tibbetts has been elected to the company's board of directors. Mr. Tibbetts is vice president for administration of Hazleton Laboratories.

●

Representative Named

INDIANAPOLIS, IND. — Blocker Propane Equipment Co., supplier of anhydrous ammonia equipment, has been named representative of Spatz Paint Industries in the state of Indiana. Bill Blocker, proprietor, will handle paint products said to be helpful in reducing corrosion caused by anhydrous ammonia in and on tanks.

●

Made Assistant Manager

SEATTLE, WASH.—Jack M. McConkey has been named by Wilson and Geo. Meyer & Co., as assistant Pacific Northwest manager of agricultural sales, with offices at 318 Queen Anne Avenue here. The 111-year-old firm distributes agricultural chemicals throughout the West.

Mr. McConkey joined the firm's Seattle sales staff in 1955 and will continue to headquarter in the Seattle office but with broadened responsibilities that include supervision of agricultural sales of the Yakima, Portland and Seattle offices of the firm. Paul Cortese, manager of agricultural sales, northwest, is headquartered in San Francisco, the firm's head office.

●

To Managerial Position

STAMFORD, CONN.—Dorr-Oliver Inc., Stamford, Conn., has announced the appointment of John W. Walborn as plant manager of the company's Hazleton, Pa. plant. Mr. Walborn came to Dorr-Oliver on Feb. 15 from his previous position as manufacturing manager with Farris Engineering Corporation of Palisades Park, N.J.

Rockwell Appointment

PITTSBURGH, PA. — Thomas O. Carson has been named assistant vice president, meter & valve division sales for Rockwell Manufacturing Co.

Mr. Carson, who has been regional manager-central region, will headquarter in Pittsburgh and be responsible for coordinating sales of all meter & valve division products east of the Mississippi.

The promotion was announced by P. C. Kreuch, vice president, meter & valve division sales. Succeeding Mr. Carson is D. H. Shoemaker, Pittsburgh district manager since 1957.

●

Vulcan Names New VP

BIRMINGHAM, ALA.—Leo T. Ryan has been elected vice president-sales of Vulcan Steel Container Co., according to an announcement by Gordon D. Zuck, president of the firm. Mr. Ryan will make his headquarters in Birmingham.

Leo T. Ryan

A native of Alabama, Mr. Ryan attended the University of Alabama and received his degree in commerce and business administration. He has held the position of general sales manager of Vulcan since 1958.

Vulcan manufactures a complete line of steel pails and drums.

●

Chemagro Appointment

KANSAS CITY, MO. — Robert J. Smith, Jr., has been appointed a technical sales representative by Chemagro Corp., Kansas City, Mo., manufacturer of agricultural chemicals. He has been assigned to the company's Eastern Region, and will make his headquarters at Montgomery, Ala.

Prior to joining Chemagro, Mr. Smith served as a sales representative with American Cyanamid Co. and earlier as an agricultural technician with the same firm. At one time he was assistant state plant pathologist for the Tennessee Department of Agriculture.

●

To Head Western Firm

LOS ANGELES — Western States Chemical Corp. has announced the appointment of R. H. McGough as its new president. Mr. McGough will assume his new responsibilities immediately.

R. H. McGough

A well known chemical marketing executive, Mr. McGough previously was general manager of agricultural chemical sales for Collier Carbon and Chemical Corp. Western States Chemical Corp. manufactures granulated ammonium phosphate fertilizer marketed under the "GRO" brand throughout the West.

MEET PRESCRIPTION SOIL TESTS EVERY TIME
with a Continental
Blend-O-Mixer
THE COMPLETE FERTILIZER MIXING PLANT

BLEND-O-MIXER is a self-contained one man operated fertilizer mixing factory. The 17' x 5' completely automatic mixing unit delivers one ton every three minutes. The rate of ingredients is controlled by an electric timer. Mixes any one blend of over 6,000 possible formulas.

Hopper cars are automatically unloaded by the tubular conveyor and automatically stored in 5, 100 ton capacity bins. Unit is available in either electric or gas engine drive.

- SIMPLE ADJUSTMENTS FOR DIFFERENT GRADES MADE IN ACCORDANCE WITH CHART
- MINIMUM SEGREGATION OF MATERIALS
- A REAL MONEY-MAKER FOR THE MANUFACTURER

YOU CAN BUY
BUILD or RENT

BUY . . . the Continental Blend-O-Mixer and install it in your own plant. We do the installation — usually completed in one week.

RENT . . . a Blend-O-Mixer at a nominal tonnage charge. No capital investment required and manufacturer will realize substantial savings in production costs.

BUILD . . . a separate building for Blend-O-Mixer adjacent to your existing plant. Low, extended payments arranged. New building and equipment should be debt free in 3 years.

MAIL NOW FOR FREE BROCHURE
YES! I am interested.
Please send me brochure and more information:
I have my own building ☐
I will need a plant: Liquid ☐ Dry ☐
My present annual tonnage is _____
NAME _____
ADDRESS _____
CITY _____ ZONE ____ STATE _____

MANUFACTURED, SOLD AND INSTALLED BY
CONTINENTAL SALES CO.
Box 212 • NEVADA, IOWA • Phone EVergreen 2-2145

More protein—more meat. High-protein grains pay big dividends in faster-growing, fatter cattle and sheep.

Pass this word on to your fertilizer customers...

NITROGEN FERTILIZATION CAN MEAN 30% HIGHER PROTEIN GRAIN... FASTER-GROWING, FATTER CATTLE AND SHEEP

Nitrogen fertilization can increase grain protein content by more than 30% ... per-acre grain yield by more than 100%. High total crude protein in grains means more beef, lamb and mutton—*on less purchased protein feed supplements.* Our "Tech-Tips" Bulletin #4 gives full details . . . and Texaco offers 16 Nitrogen solutions for fertilizer manufacture.

Solutions range from 37% to 53% nitrogen content. Sixteen different Nitrogen Solutions—ranging from 37% to 53% nitrogen content—are available at our Lockport, Illinois, plant. Six solutions also contain urea. Delivery is always fast and on-time because of ample loading, switching and transportation facilities.

Technical advisory service available. Write—if you have a technical problem involving fertilizer manufacture. Our Research may have the information you need.

Our manual, "Texaco Ammonia and Nitrogen Solutions For Farm and Industry," also contains much useful information for the fertilizer manufacturer. For your free copy, plus regular copies of "Tech-Tips" as they appear, write:

Texaco Inc., *Petrochemical Sales Division,* 135 East 42nd Street, New York 17, N. Y., or 332 South Michigan Avenue, Chicago 4, Ill., Dept. CR-30.

Tune In: Texaco Huntley-Brinkley Report, Mon. Through Fri.-NBC-TV

TEXACO
PETROCHEMICALS

AQUA AMMONIA, ANHYDROUS AMMONIA, NITROGEN SOLUTIONS, DIISOBUTYLENE, ODORLESS MINERAL SPIRITS, NAPHTHENIC ACID, PROPYLENE TETRAMER AND RUST INHIBITORS, CUMENE, BENZENE, TOLUENE

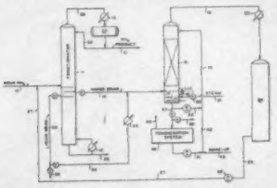
PRODUCTION PROCESS PATENTS

2,976,140

Process for Producing Ammoniated Phosphatic Fertilizers. Patent issued March 21, 1961, to John N. Carothers and Rudolph J. Hurka, Jr., Atlanta, Ga. The process of producing ammoniated phosphate in which substantially all of the P_2O_5 is available from acidulated phosphate rock in the presence of fluorine remaining in the rock after acidulation which comprises: acidulating the rock with sulfuric acid in the proportion of 1.77 pounds to 2.06 pounds H_2SO_4 to each pound of P_2O_5 in the rock and with sufficient water to form a moist product, allowing the acidulated rock to age without substantial drying for at least a week, whereby it will contain after aging in excess of 6% moisture, and adding ammonia to the acidulated rock to produce a product having in excess of 6.5 parts ammonia to 20 parts P_2O_5 while maintaining the temperature during ammoniation below 75° C.

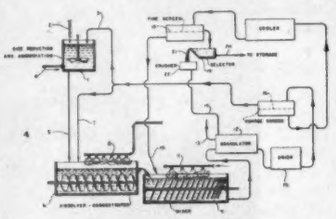
2,977,197

Recovery of Ammonia from Aqua Ammonia. Patent issued March 28, 1961, to Loyd W. Adams and Russell K. Simms, Bartlesville, Okla., assignors to Phillips Petroleum Co., Bartlesville. A process for the recovery of anhydrous ammonia from aqua ammonia which also contains carbon dioxide, which process comprises: introducing said aqua ammonia into a fractionating column at a point intermediate its ends; operating said column under distillation conditions such that a region of high carbon dioxide concentrating forms in the central portion of said column; withdrawing a side stream containing carbon dioxide from said column at a point of maximum carbon dioxide concentration within said region of high carbon dioxide concentration; treating said side stream to remove carbon dioxide therefrom; returning the treated side stream to said column; and recovering essentially carbon dioxide-free anhydrous ammonia product overhead from said column.



2,978,313

Granular Fertilizers and Processes for Making Them. Patent issued April 4, 1961, to Jean Moyrand, Chauny, and Bernard Bigot, Grand Quevilly, France, assignors to Compagnie de Saint-Gobain, Paris, France. In a process of producing a ternary fertilizer in which phosphate of fertilizer grade is reacted with mixed inorganic acids containing nitric acid, the steps of ammoniating the acidified reaction mass and removing calcium nitrate therefrom, subsequently ammoniating the reaction mass and adding a final product of the process containing a soluble potassium component thereto during the ammoniation, and then adding a further amount of a soluble potassium salt to the product of ammoniation, and granulating and drying the product.



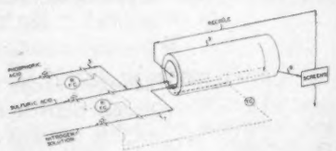
2,977,212

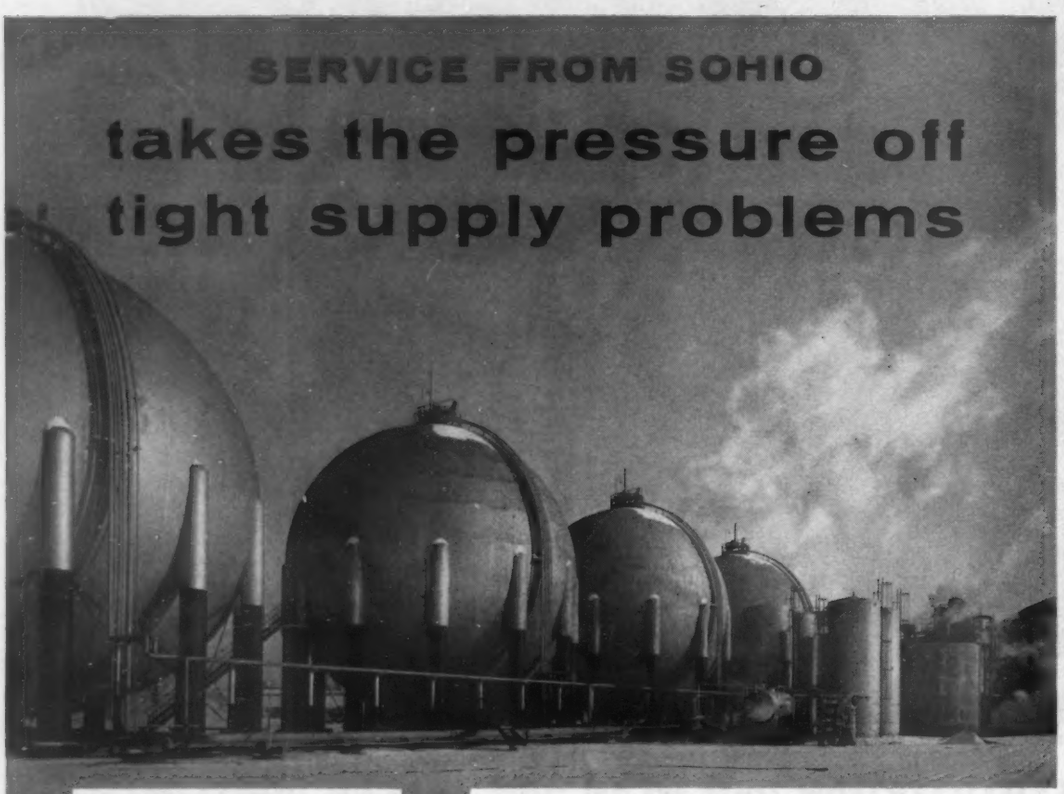
Herbicidal Compositions and Methods. Patent issued March 28, 1961, to Nathaniel Tischler, Middlesex County, N.J., assignor to Heyden Newport Chemical Corp., New York. A method for controlling the growth of vegetation which comprises applying to the media to be treated a composition comprising as an active ingredient a herbicide selected from the group consisting of 2,3,6-trichlorophenylacetic acid and the salts of said acid.

2,980,526

Preparation of Mixed Fertilizers. Patent issued April 18, 1961, to Joseph F. Wilson, Bartlesville, Okla., assignor to Phillips Petroleum Co.

A process for the continuous production of a dry, granular fertilizer containing approximately 26-27 weight percent nitrogen and 14 percent phosphorus, as P_2O_5, using only liquid reactants which comprises bringing together in an agitated reaction zone proper amounts of a nitrogen-containing solution in the form of a solution of ammonium nitrate and anhydrous ammonia in water and concentrated sulfuric acid at least about 90 percent by weight and concentrated phosphorus acid having at least 45 percent by weight P_2O_5 in the presence of pre-formed solid subdivided fertilizer product having substantially the aforesaid composition, maintaining the reaction zone at a temperature in the approximate range of 195-230° F., maintaining a sufficient body of solid product in the reaction zone to ensure discharge of





Sohio's storage facilities — largest in the country in relation to production capacity — keep nitrogen materials on tap for your peak season needs.

• • •

Sohio pioneered, and now sets new standards for speedy truck delivery of nitrogen materials.

WHEN you order nitrogen materials you naturally expect quick-time service and delivery. And that's just where Sohio shines.

Sohio's storage facilities — a continually expanding array of storage spheres, tanks and warehouses — provide an adequate inventory of nitrogen materials to meet your rush-season demands. Like clockwork, Sohio materials move out on the 5 rail lines serving the Sohio plant at Lima. Truck fleet delivery, developed by Sohio, gives you the fastest delivery possible.

A complete line of Sohiogen® Solutions, anhydrous and aqua ammonia and Sohigro® Urea meets your every requirement . . . gives you the full-range flexibility you need in manufacturing high-analysis finished goods.

These "ingredients" of Sohio SERVICE just can't be duplicated. Call the "Man from Sohio" today for details on how you can benefit from Sohio Service.

See Sohio first for high quality anhydrous ammonia—aqua ammonia—coated 45% or uncoated 46% urea—and 18 nitrogen solutions, including those containing urea. You want it—we have it.

. . . we're serious about SERVICE at Sohio

SOHIO CHEMICAL COMPANY

Agent for Solar Nitrogen Chemicals, Inc.

Fort Amanda Rd., P.O. Box 628 • Lima, Ohio

Phone CApitol 5-8015 or wire (TWX call letters LIMA O 497-U)

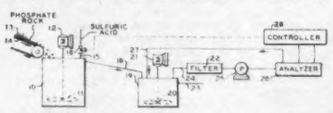
SOHIO

A-8

dry, solid granular product therefrom, separating from granular product thus obtained a desired first portion of on-size product consisting essentially of dry, granular fertilizer containing approximately 26-27 weight percent nitrogen and 14 percent phosphorus, as P_2O_5, and a second portion of product composed of material having a size not appreciably larger than on-size product and containing a substantial portion of smaller than on-size material, recycling said second portion of solid granular product to said zone, adjusting the ratio of the recycled product to liquid reactants fed to said reaction zone, on a weight basis, to a value of at least about 2:1 and whenever the said ratio is less than about 3:1 yet not less than about 2:1, maintaining a ratio by weight of said recycled product to total weight of the acids above about 4:5:1.

2,979,385

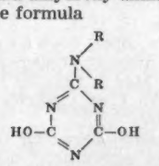
Analyzer and Method of Control. Patent issued April 11, 1961, to Francis W. Karasek, Bartlesville, Okla., and John G. Skinner, Portland, Ore., assignors to Phillips Petroleum Co. Apparatus for use in the production of phosphoric acid and for maintaining the sulfate ion concentration thereof within a predetermined range, comprising: a first mixing vessel; means to add phosphate rock to said vessel; means to add sulfuric acid to said vessel; means to withdraw a sample stream from said vessel; analyzer means to measure the concentration of sulfate ions in said re-



moved sample stream, said analyzer means comprising first and second sample cells, means to direct first and second radiation beams through said first and second cells, respectively, a second mixing vessel, means to direct a reagent through said first cell into said second vessel, said reagent being a reagent which will react with said sulfate ions in said sample stream and change the light transmission properties thereof, means to add at least a portion of said removed sample stream to said second vessel, means to direct the resulting mixture of said reagent and said portion of said sample stream from said second vessel through said second cell, and comparison means to compare the radiation beams transmitted through said first and second cells; means responsive to said comparison means to control the relative rates of addition of said sulfuric acid and said phosphate rock to said first mixing vessel; and means for recovering phosphoric acid product having a predetermined sulfate ion concentration.

2,976,207

Dihydroxy - Aminotriazine Insecticides. Patent issued March 21, 1961, to Randel Q. Little, Jr., Munster, Ind., and Jack F. Bussert, Calumet City, Ill., assignors to Standard Oil Co., Chicago. The method of increasing the resistance of vegetation to damage from insects, mites, fungus growths which comprises applying a dihydroxy-amino-triazine to said vegetation, said dihydroxy-amino-triazine having the formula



where at least one of the R groups is an alkyl radical of 4 to 25 carbon atoms and the other R group is selected from the group consisting of an alkyl radical of 4 to 25 carbon atoms and a hydrogen atom.

2,976,210

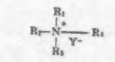
Pest control Compositions Containing Oxidized Polyethylene Wax. Patent issued March 21, 1961, to John N. Cosby, Morristown, and Merrill M. Darley, Basking Ridge, N.J., assignors to Allied Chemical Corp., New York.

An aqueous pest control dispersion comprising (1) a pest control agent, (2) between about 0.1 pound and 1.0 pound per 100 gallons of dispersion of a readily emulsifiable oxidized waxy polymer of ethylene characterized by recurring—CH_2—groups, which is the reaction product of a waxy ethylene polymer and molecular oxygen, containing between about 3% and about 9% oxygen, and having an average molecular weight between about 600 and about 5,000, a melting point between about 90° C. and about 110° C., an acid number of at least about 10 but not more than about 50 and a ratio of saponification number to acid number between about 1 and about 1.5; (3) an emulsifying agent and (4) water, said dispersion having the property when applied to weather-exposed surfaces of providing a water-resistant solid coating having prolonged pest-control activity.

2,980,577

Nematocide. Patent issued April 18, 1961, to Morris L. Nielsen, Dayton, Ohio, assignor to Monsanto Chemical Co., St. Louis.

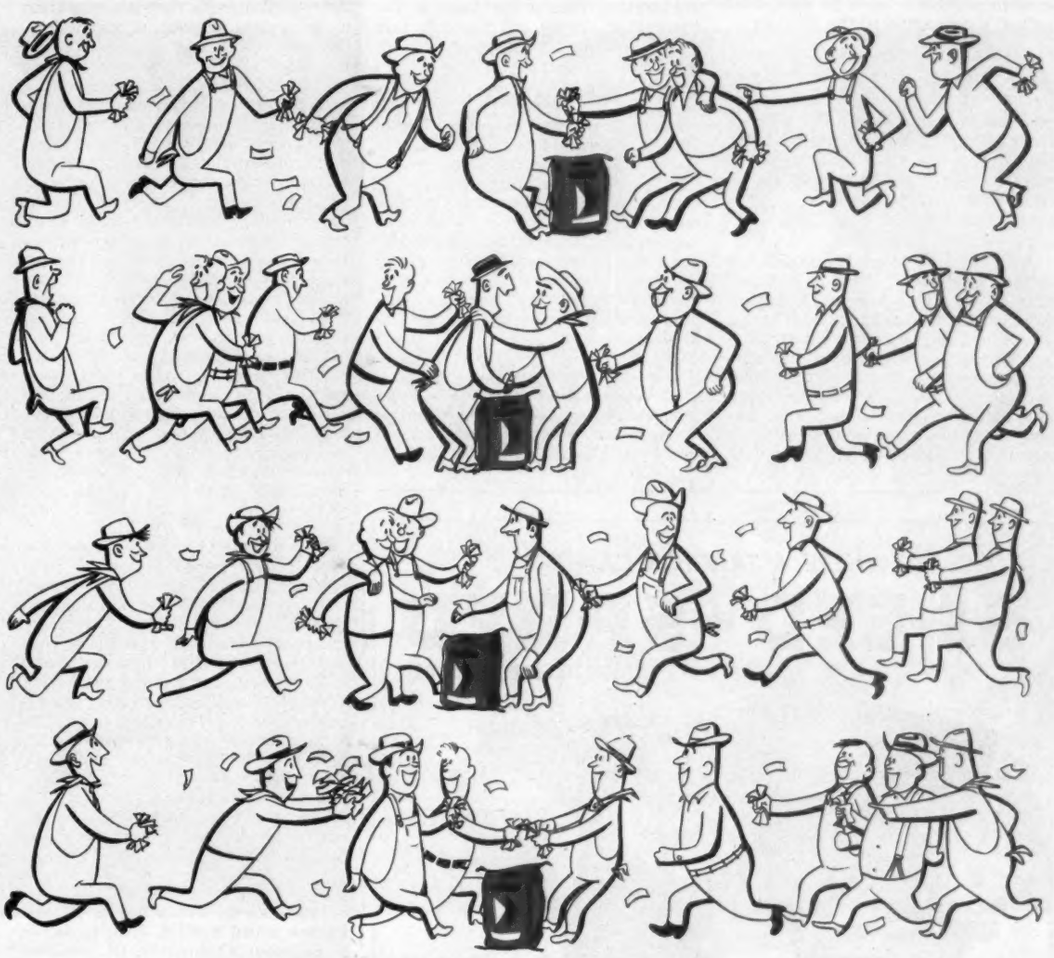
The method of controlling nematodes comprising exposing said nematodes to a toxic quantity of a nematocidal composition comprising as the essential active ingredient a quaternary ammonium thiocarbonate reaction product of a quaternary ammonium compound of the formula



where R_4 is an alkyl hydrocarbon radical having not more than about 18 carbon atoms; R_1, R_2, and R_3 are selected from the class consisting of alkyl hydrocarbon radicals having not more than 18 carbon atoms when taken separately and when taken together the carbon and hydrogen atoms necessary to form the pyridine nucleus of which the nitrogen is a member, and Y is selected from the class consisting of the hydroxy and halide anions, with a salt selected from the class consisting of the ammonium, alkali metal and alkaline earth metal salts of trithiocarbonic acid and tetrathioperoxycarbonic acid.

2,976,141

Process for the Recovery of Values from Phosphate Rock. Patent issued March 21, 1961, to John N. Carothers and Rudolph J. Hurka, Jr., Atlanta, Ga. In a process of recovering values from high grade Florida phosphate rock, reacting the phosphate rock with sulfuric acid as the only acid limited to an amount approximately 80% of that required to convert the P_2O_5 content of the rock to phosphoric



MAGCOBAR GRANULARS HAVE SALES APPEAL

Magcobar® INDUSTRIAL PRODUCTS

That's right! Sales appeal that you can see and feel. When you make pesticides with Magcobar granular carriers, you build sales appeal right into your product. Magcobar granulars appeal to farmers because they're free flowing, feel better, and look better.

And when it comes to performance they appeal, too. Magcobar granulars are high in absorbency, consistent in high quality, and uniform in clean grades.

Farmers will buy pesticides made with Magcobar granulars because they look better, they are better.

See for yourself. Put the sales appeal of Magcobar granulars into your product. Call or write the man from Magcobar today.

CARRICLAY
6 to 8 VM
Granular and Pulverized
PULGITE
12 to 14 VM
Granular and Pulverized
ARROWHEAD
Granular Bentonite

MAGNET COVE BARIUM CORPORATION
Philadelphia 7, Pa. 702 Western Savings Fund Bldg.
Houston, Texas P. O. Box 6504

acid and in the presence of sufficient water to form a filterable solution, separating the resulting solids from the solution, said solution containing from 7% to 16% P_2O_5, from 0.2% to 1.7% fluorine, from 0.043 to 0.2% aluminum together with sulfate, calcium, and rare earths, the sulfate being in an amount whereby the SO_4—/Al weight ratio in the solution is at least two and one half parts sulfate to one part aluminum, thereby to precipitate fluometallic compounds in the form of octahedral crystals containing aluminum, fluorine, calcium and sulfate, and separating the crystals from the solution.

2,979,435

Ethylene-Sulfonyl Fungicides. Patent issued April 11, 1961, to Maynard S. Raasch, Wilmington, Del., assignor to E. I. du Pont de Nemours & Co., Inc., Wilmington. A method for the prevention and destruction of fungi comprising applying to the organic material to be protected, in an amount sufficient to exert fungicidal action, a compound of the formula

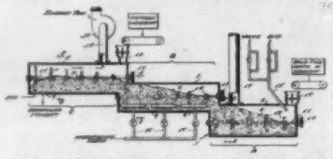
$$R—SO_m—\underset{X}{C}=\underset{H}{C}—SO_n—R'$$

wherein R and R' are alkyl radicals having from 1 to 12 carbon atoms, inclusive, m and n are positive whole numbers not greater than 2, and X is halogen.

2,976,126

Apparatus for Manufacturing Mixed Fertilizers. Patent issued March 21, 1961, to James E. Seymour, Collinsville, Ill., assignor to Central Farmers Fertilizer Co., Chicago.

An apparatus for use in manufacturing granular mixed fertilizer comprising: a first elongated substantially closed reaction chamber; a second elongated, closed reaction chamber arranged in ascending series with said first reaction chamber, the downstream end of said first chamber communicating with the upstream end of said second chamber by means of a throat; a third elongated, ventilated reaction chamber arranged in ascending series with said second reaction



chamber, the downstream end of said second chamber communicating with the upstream end of said third chamber by means of a throat; supply means feeding fertilizer ingredients and water to said first chamber; mixing and advancing means arranged in each of said chambers for advancing the mixture of said fertilizer ingredients and said water in the form of a reaction bed, said bed creating a vapor seal at each of said throats; and evaporating means for passing the current of drying gas through said third chamber in intimate contact with said mixture.

2,977,209

Composition for Combatting Weeds. Patent issued March 28, 1961, to Harry Tilles, El Cerrito, and Joe Antognini, Mountain View, Cal., assignors to Stauffer Chemical Co. The method of combatting weeds comprising applying a phytotoxic amount to the soil of a compound selected from the group consisting of phenyl N,N-dimethylthiolcarbamate, phenyl, N,n-butylthiocarbamate, and phenyl N-allylthiolcarbamate.

2,977,213

Process for the Production of Complex Fertilizers Containing Nitrogen, Phosphorus, Potassium, and Magnesium. Patent issued March 28, 1961, to Aulo Maluta and Liborio Casale, Milan, Italy, assignors to A.P.E. Applicazione Processi Elettrochimici, S.p.A., Genoa, Italy. A process for producing quaternary complex fertilizers containing a high concentration of potassium as well as magnesium, nitrogen and phosphorus, comprising the steps of (1) adding to a starting material containing a mineral of a double salt of potassium and magnesium, said mineral selected from the group consisting of kainite, leonite, schoenite, langbeinite, hartsalz, and mixtures thereof, a solution of 25% phosphoric acid in an amount approximately equimolar to the magnesium content of the starting material, independently of the potassium content of the latter, and ammonia in an amount of approximately 3 mols NH_3 for every mole of H_3PO_4, thereby binding at least part of the magnesium contained in the starting material as a phosphatic magnesium salt, and (2) drying the resulting product to obtain a fertilizer containing nitrogen, magnesium and potassium, and having a P_2O_5 content which is 98-100% soluble in ammonium citrate.

2,977,285

Process of Producing Gibberellic Acid. Patent issued March 28, 1961, to Arthur John Birch, Manchester, and Ian Stewart Nixon and John F. Grove, Welwyn, England, assignors to Imperial Chemical Industries, Ltd., London, England. An improved metabolic process for the production of gibberellic acid by cultivating an active strain of Gibberella fujikuroi in a nutrient medium and checking active growth to promote gibberellic acid production characterized in that the rate of the said acid production is increased by the addition of mevalonic acid lactone as a precursor to the nutrient medium.

2,978,311

Processes for Producing Fertilizers. Patent issued April 4, 1961, to James E. Seymour, Collinsville, Ill., assignor to Central Farmers Fertilizer Co., Chicago. A method of making phosphatic fertilizers which is characterized by the steps of: admixing (1) a metaphosphate selected from the group consisting of calcium, sodium and potassium metaphosphates, (2) from one to four times the stoichiometric amount of water required for complete hydrolysis of said metaphosphate and (3) a basic fertilizer material; autoclaving said mixture under superatmospheric pressure and at an elevated temperature not exceeding 350° F.; and agitating said mixture during autoclaving, said agitation and autoclaving being continued until said metaphosphate is substantially completely hydrolyzed to a water-soluble orthophosphate, said basic fertilizer material neutralizing any acid formed by said hydrolysis reaction, said mixture being thereby converted to a substantially dry, fully reacted, soluble fertilizer without the addition of acid.

2,976,206

Pesticidal Composition. Patent issued March 21, 1961, to Edward C. Baillie, Moorestown, and Lewis F. Stevens, Haddonfield, N.J., assignors to Pittsburgh Plate Glass Co. A pesticidal composition which when applied to apple trees is effective to control European red mites, apple cedar rust, apple scab and apple powdery mildew, which comrises a uniform blend of about 65 to about 75 parts by weight of sulfur, about 7 to about 12 parts by weight of ferric dimethyldithiocarbamate, and about 2 to about 5 parts by weight of 2,3-dichloro-1,4-napthoquinone, the blend being of an average particle diameter below about 5 microns.

IOWA CORN KING BOOSTS HERBICIDE APPLICATION

COON RAPIDS, IOWA — Roswell Garst, hybrid corn king and sage prairie philosopher, whose various claims to fame include his hosting Nikita Khrushchev of Russia during the latter's visit to the Midwest a few years ago, told a Tennessee audience in April that he does not intend any more to cultivate corn in the traditional way. Instead of the plow, he will continue to use herbicides which render the cornfields virtually weed-free and increase yields significantly.

Despite the per acre outlay to apply weed killers, Mr. Garst says, the increased yield of the crop "is more than enough to pay this expense. All cultivation causes root damage to corn. With herbicides, you don't go back to the corn field from planting 'til harvesting time."

Mr. Garst declares that new pesticides and multi-row farm machines will soon make necessary a farm labor force of only 4% of the population instead of the present 8% now working on farms.

Industry Trade Marks

The following trade marks were published in the Official Gazette of the U.S. Patent Office in compliance with section 12 (a) of the Trademark Act of 1946. Notice of opposition under section 13 may be filed within 30 days of publication in the Gazette. (See Rules 20.1 to 20.5.) As provided by Section 31 of the act, a fee of $25 must accompany each notice of opposition.

Spectracide, in capital letters, for insecticide. Filed June 21, 1960, by Geigy Chemical Corp., Ardsley, N.Y. First use June 3, 1960.

Herkol, in capital letters, for insecticide. Filed July 27, 1960, by Norda Essential Oil & Chemical Co., Inc., New York. First use April 7, 1958.

Grow B-Low, in capital letters, for soil conditioner, consisting of a mixture of clay, peat moss and other materials. Filed March 3, 1960, by Star Enterprises, Inc. Cassopolis, Mich. First use Jan. 3, 1960.

Flora-Dex, in capital letters, for liquid plant food concentrate. Filed Aug. 31, 1960, by Alvin M. Goldstein, doing business as Aldy Laboratories, Minneapolis, Minn. First use June 4, 1959.

Hi-Yield, in hand-drawn outlined letters, for fertilizers. Filed Feb. 5, 1959, by Hi-Yield Fertilizer Co., Bonham, Texas. First use Sept. 6, 1950.

E Sincat, with lettering within hand-drawn oval, for fertilizers. Filed April 1, 1960, by Sincat Soc. Industriale Catanese S.p.A., Palermo, Italy.

Fieldcrest, in capital letters, for commercial fertilizer. Filed Oct. 31, 1960, by Fieldcrest Fertilizer Co., Madison, Minn. First use March 1, 1955.

Cel-U-Mulch, for fertilizer. Filed March 28, 1960, by Paxton Processing Co., Paxton, Ill. First use Nov. 3, 1959.

Fertilium, in heavy letters, for organic compost for use on lawns, gardens and farms. Filed April 15, 1960, by Pearl Products, Inc., Glenside, Pa. First use Jan. 16, 1953.

Robertson's Blue Banner Plus Brand, with drawing of flag, for fertilizer. Filed May 4, 1960. by Robertson Chemical Corp., Norfolk, Va. First use, 1959.

Hormex, hand-lettered on triangular design, for agricultural chemicals defined as agricultural plant hormones. Filed Aug. 15, 1960. by Brooker Chemical, Sherman Oaks, Cal. First use Aug. 1, 1959.

Neo-Vita, in capital letters, for liquid preparation for mineralizing and neutralizing soil, with incidental fungicidal and bactericidal properties. Filed Aug. 17, 1960, by Re-Mark Chemical Co., Inc., Miami, Fla. First use May 1, 1950.

GOES ANYWHERE A TRACTOR CAN GO

SPEED-SPRED

FERTILIZER SPREADER

LIGHTWEIGHT! DOESN'T PACK SOIL OR LEAVE RUTS!

$495.00 F.O.B. Factory, Less Tires

MODEL 300. Complete with Stainless Steel conveyor. SHIELDED P.T.O. drives spinner. Positive drive tractor control clutch for feed apron. Wt. 610 lb.

$565.00 F.O.B. Factory, Less Tires

MODEL 301. Same as Model 300 but with gasoline engine to drive spinner instead of P.T.O. Wt. 672 lb.

- 2000-lb. capacity box. 3000 lb. when side extensions are used.
- Stainless Steel conveyor apron. Non-rusting for EXTRA LONG LIFE.
- Conveyor apron is ground driven for accurate spreading at any tractor speed.
- Spreads all types of dry fertilizer up to 40 ft. wide in even pattern.
- Spreading rate adjustable from 50 to 1000 lb. per acre.
- 18-inch spinner fan with 6 adjustable fins. V-belt drive from gear box.
- 60-inch spacing between wheels straddles 2 corn rows.
- All wearable parts replaceable. Service quickly available.
- Fitted tarpaulin cover (optional equipment).

ATTENTION! FERTILIZER DEALERS AND FARMERS

Don't let heavy spreader trucks get stuck in your fields or pack wet soil. Have your fertilizer spread with a CALHOUN SPEED-SPRED. Any time a tractor can get into a field, the lightweight SPEED-SPRED can follow without packing soil or leaving ruts. It's easy to operate . . . saves power and fuel.

WRITE OR TELEPHONE

Calhoun MANUFACTURING COMPANY, INC.

COlfax 6-1707 CEDAR FALLS, IOWA

PESTICIDES

Continued from page 15

ment, in effect for more than five years, has worked out even more satisfactorily than had been anticipated by its backers. The USDA has worked diligently in this field, from the standpoint of the cooperation contemplated in the Miller Amendment, and in the formulation and control of label directions for safe use.

Cottonseed meal and cake containing pesticide residues, when fed to dairy animals, could contaminate milk. Since there is a zero tolerance for such residue in milk, consideration of this matter is important in cotton pest control. However, the Food Protection Committee of the National Academy of Sciences—National Research Council, has expressed the opinion that zero tolerances in milk are not scientifically justified. The committee observed: "Regulations would be scientifically sound if based on reasonable judgments assuring safety in the case of small residues that are unavoidable in milk even under the best production practices."

Another factor of significance in discussing pesticidal residues, is that of "food additives" which, according to provisions of the 1958 amendment to the Food and Drug Act, require that the use of any substance which becomes a component part of any food, or in any way changes the characteristics of any food, must be covered by the law prescribing how the additive might be used safely.

It is in this area that the Delaney "cancer" clause is involved. This clause states that no permission will be granted to use an additive, if it has been found to cause cancer in man or animals when fed at any level of intake. The USDA feels that this amendment is unnecessarily restrictive, as do many scientists as well as members of the President's Science Advisory Committee, set up to study food additives. The amendment also limits approval of certain materials by the Secretary of Health, Education and Welfare, regardless of whether or not he might otherwise decide that their use might be safe. A literal interpretation of the Delaney amendment would lead to the banning of any substance that increases the incidence of cancer in test animals, at any level of ingestion.

The President's Science Advisory Committee arrived at this basic conclusion: Interpretation of the Food Additives Amendment requires discretion because so many variables enter into a judgment as to whether a particular substance is, or is not, carcinogenic.

Despite all of these legal requirements of pesticide chemical use, chemicals are here to stay. Farmers have come to rely on them to protect crops and livestock from insects, diseases, and weeds, and to increase the efficiency of farm operations in many other ways. They are an essential production tool and we have no present alternative to their use.

But we must search for more efficient ways to use them. We must continue to look for new chemicals that have a wide margin of safety. And we must continue to look for new control techniques that can be used alone or with chemicals. And, greater emphasis needs to be placed on the use of chemicals in the weakest link of the life cycle of insects.

One important fact worth remembering: No other country in the world has the comprehensive laws and enforcement procedures that we do, to insure the safe use of chemicals for food production and distribution. Many of the newer pesticides used in this country are commonly used in Europe, too.

The past decade has seen the development of the most extensive body of research data on all aspects of pesticides that exists anywhere in the world. Much of this stems from the highly dynamic and progressive nature of the agriculture in this country, and the large and necessary role of pesticide chemicals. It is unlikely that any other country will ever approach the magnitude of our research on this topic. Millions of dollars have been spent on study of pesticides, and many millions more will be spent in the future.

All this concentration of research, money, time, and energy has only one objective—to provide a safe and adequate agricultural output at reasonable cost.

Every effort must be made to inform the public objectively on the provisions instituted to assure a safe and wholesome food supply. The program for pesticide safety endorsed by the federal government, implemented by industry and practiced by agriculture, is founded so firmly on logic and facts, and so tempered with extra precaution, that there should be no need even to defend it. It might be more realistic if critics of present-day pesticide use were challenged to accept full responsibility for our food supply, if pesticide usage were to be unrealistically curtailed.

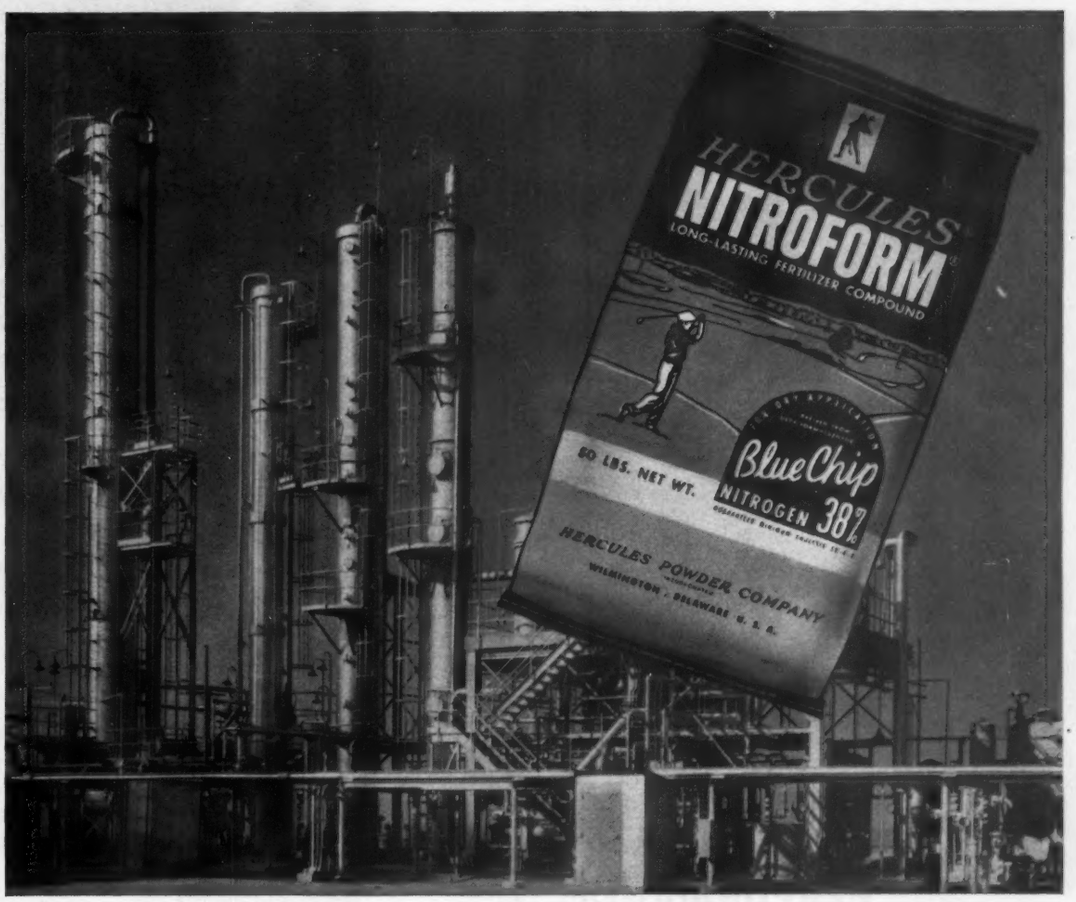
Research shows that pesticides can be used with safety. And certainly, it makes good sense to use them safely. Otherwise, prohibitively restrictive legislation may be required to police the few individuals who are not careful in using these materials.

It would be encouraging to say that the big changes in pesticide control are over, and we have only a few more things to learn before we know all the answers.

But, unfortunately, such is not the case. We are still in a transition period that may last some time. We may, during this period, find new and specific pesticidal chemicals. We may establish tolerances for all useful chemicals that leave residues on foods. And we may find that food production will become an even more precise science than it is today.

Two final points are so important that they cannot be overemphasized. First, the overwhelming fact that has clearly emerged from the many studies, hearings, and discussions of the past few years is that our foods are safer and more wholesome than ever before, and chemicals used on farms help make them so.

And second, it is vital to keep in mind that the label tells the story. Before using a pesticide, the user must read the label carefully and follow directions.



NOW...
A Continuous Ureaform Production Unit

At these brand-new facilities in California, Hercules manufactures Nitroform®, the new storage-stable ureaform fertilizer. Rigid production controls maintained at this ultra-modern installation give Nitroform the high activity-index value so vital to quality fertilizer performance.

Nitroform, a chemical bond of urea and formaldehyde, is an insoluble powder which decomposes slowly through the biochemical activity of soil bacteria. Hence, Nitroform is a long-lasting fertilizer compound which will outlast conventional fertilizers as much as six to eight times!

Tailor-made to meet the needs of fertilizer manufacturers around the world, Nitroform is available in a variety of grades. With the new production facilities, Nitroform can be shipped in truck or carload from here and from stock points in the South, Midwest, and East. Write for further data and free sample, or contact your local Hercules Sales Office.

Nitroform® Fertilizer is a product of:

HERCULES POWDER COMPANY

Hercules Tower, 910 Market Street, Wilmington 99, Delaware

Missouri Mixer Finds Good Service Pays Off

A THRIVING fertilizer mixing business has been developed in Plattsburg, Mo. by two enterprising brothers, Eldon and Howard Freeman. The "Sur-Gro" firm mixes plant food for farmers residing in some five counties of northwestern Missouri, and includes among its services application of both liquid and dry mixes, soil testing, inclusion of pesticides with fertilizer, and the technical service of agronomists employed on the staff.

The company's liquid plant manufactures 14 tons per batch, and the operators report that this type of plant food appears to be gaining in popularity in their area. An additional liquid mixing plant is operated at Mexico, Mo. and the firm has five solution stations with storage for 130,000 gal. of liquid.

Liquid fertilizer spreading service is accomplished by three spreading trucks which are kept on the move almost continuously during the busy spring season. The liquid fertilizer business, according to Eldon Freeman, president of the firm, fits in nicely with the Phillips oil distributorship held by the company.

Dry mixing is accomplished by use of a front end loader, weigh hopper, and an elevator leg which transports ingredients to the top of the mixing building where a rotary 5-ton mixer completes the job. Finished goods are as a rule put in spreader trucks or spreaders towed by tractors, and sent directly to the farm. Three spreader trucks for dry application are operated by the company, in addition to spreader equipment towed by tractors. Some 12 dealers also bring their spreader trucks to Plattsburg to be loaded.

The company handles raw phosphate rock also, and applies this ingredient upon request. A new 225-ton bin was recently installed, bringing the storage capacity to 1,200 tons.

Plans are being made now for the early addition of lime to the firm's services. This will be applied by spreader truck, Mr. Freeman said.

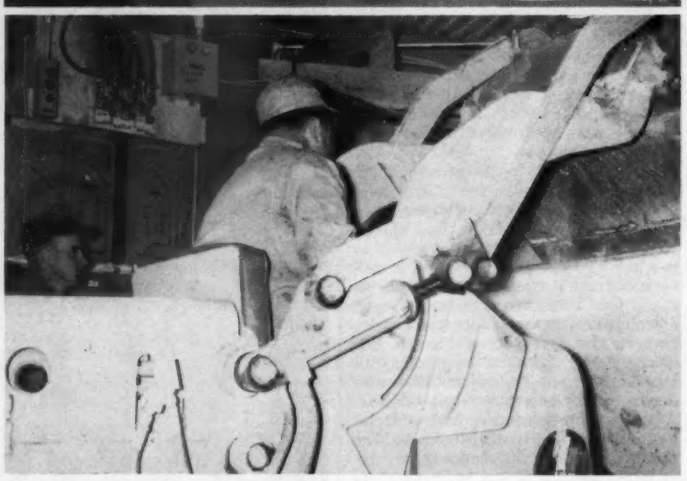
Service is a watchword at the Sur-Gro plant. Customers coming in the company's spacious office to order or to discuss their needs are given not only considerate treatment, but have available the services of Errol Willeman and Bill Kirk, agronomists who handle the soil testing services for the company, and also are effective salesmen. The company does not attempt to operate its own soil-testing laboratories, but sends samples to the state laboratory at Columbia, Mo.

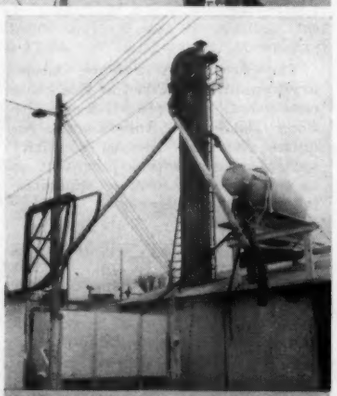
Eldridge Foulke, sales manager, advertising manager, and general promoter, points out that farmers accept without question, for the most part, analyses of soil samples checked by the state, whereas if the company were to do it, the customer might be more reluctant to regard the answers as being completely objective.

Mr. Foulke maintains a blackboard in the office lobby. On the board, he writes helpful information regarding plant food requirements, grades necessary for various crops, the amounts of plant food removed by crops at different levels of yield, and the admonition: "HAVE YOUR SOIL TESTED."

As advertising manager, Mr. Foulke keeps local newspaper sup-

These are the amounts of plant nutrients required by various crops as indicated—If they are not present in the soil, and you want top yields, you must make up the deficiet.
HAVE YOUR SOIL TESTED





MISSOURI OPERATION—"Sur-Gro" Plant Food Co. performs many functions at its Plattsburg, Mo., location. Top photo: general office and warehouse space. Spreader truck is one of three dry spreaders operated by firm. Eldridge Foulke, sales manager, points to educational blackboard in company's lobby where farmers congregate. Plant's front-end loader dumps ingredients in weigh-hopper for mixing operation. Operator Howard Freeman can reach push-button controls at his left to activate elevator leg to mixer situated above. Lower photo: exterior view of mixer and elevator. Finished goods are emptied into spreader truck.

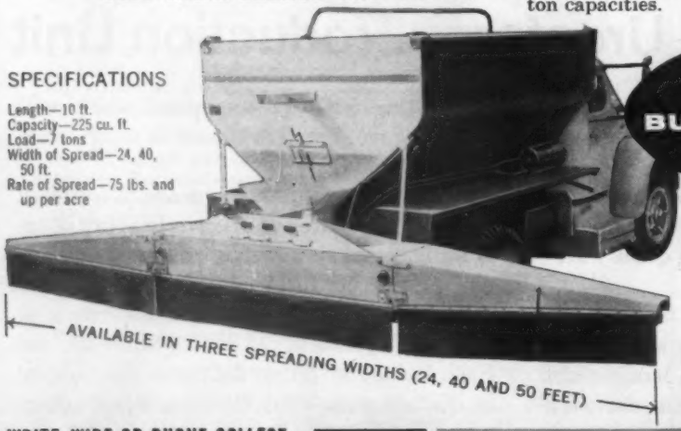
NEW DESIGN for TROUBLE-FREE FERTILIZER SPREADER PERFORMANCE

Greater Spreading Accuracy— Less Maintenance and Service

This new Simonsen bulk fertilizer spreader has the same basic, rugged construction features of the popular R710 model. In addition, new features have been incorporated for even greater convenience, accuracy and trouble-free operation. This new model "P" series is available in 4 to 13 ton capacities.

SPECIFICATIONS

Length—10 ft.
Capacity—225 cu. ft.
Load—7 tons
Width of Spread—24, 40, 50 ft.
Rate of Spread—75 lbs. and up per acre



MODEL P710 BULK FERTILIZER SPREADER

AVAILABLE IN THREE SPREADING WIDTHS (24, 40 AND 50 FEET)

New features for maintenance-free operation

- 16" (heavy duty) stainless steel apron.
- Stainless steel micro-meter adjusting screw.
- "I" beam sills to support hoods and give body greater rigidity.
- All-weather wheel drive; tires that won't go flat.

WRITE, WIRE OR PHONE COLLECT

for further information about the P710, plus a full line of other bulk fertilizer bodies, bulk feed bodies, bulk and sack bodies and unloaders.

S

SIMONSEN MANUFACTURING CO.
Dept. CL QUIMBY, IOWA Phone 72

plied with agronomic information of interest to farmer customers, and also gets spots on radio programs beamed to fertilizer users.

A monthly mimeographed publication, "Sur-Gro News" is sent to some 800 customers in the area, with results described by Mr. Foulke as being "very good." The little paper contains market information, a few "for sale" ads (published free), some philosophical quotations, and of course, sales pitches for the company's products.

The Sur-Gro Company has been in operation since 1953 when the Freeman brothers became engaged in the anhydrous ammonia business. Volume expanded and in 1955, they added a liquid blending plant. Since then the expansion has continued with the inclusion of dry fertilizer in both bags and bulk, and the application activities of the firm. More expansion is in the offing for the company, with the possibility of adding more equipment to the application end of the business.

Sun Oil Co. Uses Direct Contact Electric Heaters To Aid in Plant Start-Up

MARCUS HOOK, PA.—Direct contact electric resistance heaters for start-up operation are being used by Sun Oil Co. at its ammonia plant here. The 400-KW heater has a heated length of 14 ft. In its start-up operation, Sun Oil uses a direct contact gas heater developed by Hynes Electric Heating Co. This heater raises the temperature level of the catalyst bed to 700° F. during plant startup. Transfer of energy from heater to bed is accomplished by passing synthesis gas over the heater. The heated gas then releases some of its energy to the colder catalyst bed.

This procedure requires electrical energy from a 440-volt source. Input ranges between a starting rate of 100 amps/hour to a maximum of 900 amps/hour. The level of input is controlled to provide uniform expansion of the heater and to avoid overheating.

In general, about 20 hours' service is required to accomplish the heating phase of the operation. This is followed by a period in which the electrical input to the heater is gradually reduced and finally shut off entirely.

Management Firm Elects

NEW YORK—George V. Anderson & Associates, management recruiter and consultant, has announced the appointment of James G. Bronson as vice president. Mr. Bronson was formerly associated with Allied Chemical Corp., Food Machinery & Chemical Corp. and American Cyanamid Co. Mr. Bronson's principal activities with these organizations have been in marketing, administration and industrial relations.

VIRUS HITS WHEAT

MANHATTAN, KANSAS — A severe outbreak of soil-borne wheat mosaic virus disease was developing late in April in the 1961 Kansas wheat crop, according to Webster Sill, Jr., associate professor in the department of botany and plant pathology at Kansas State University.

Prof. Sill said the disease seems to be moving gradually westward in the state and diseased areas have been found this year in Lincoln, Ellsworth, Barton, Rice, Reno, Pawnee, and Edwards counties. It is not known how the virus spreads and becomes established, Mr. Sill said, but several hundred thousand acres of Kansas wheat are involved. He said it is too early to predict losses from the disease, but in the past it has reduced yields from 5 to 30%.

Cool, wet weather favors the disease while hot, dry weather favors the crop.

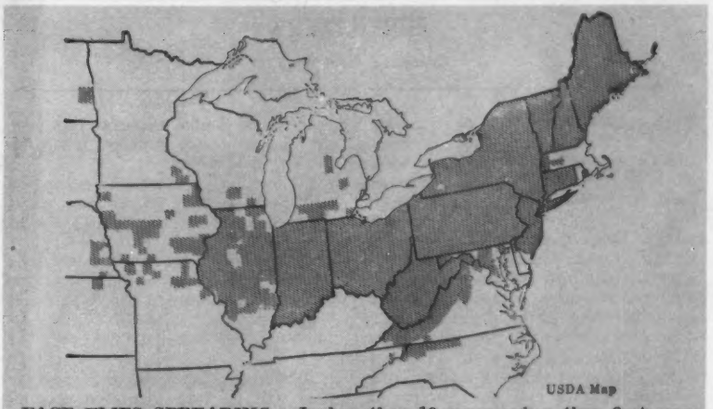
New Ammonia Plant Planned for Wales

MILFORD HAVEN, SOUTH WALES—A new ammonia plant costing $11.2 million, is planned for construction here by Esso Petroleum Co. and Fisons, Ltd., both British firms.

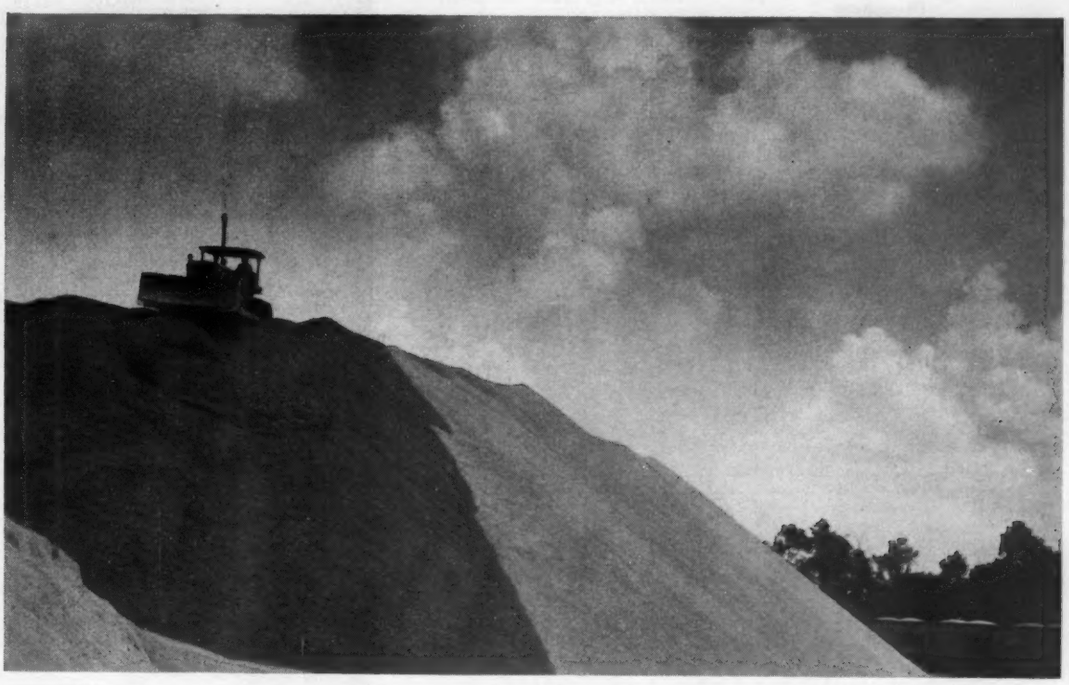
According to announced plans, construction of the plant is to get under way immediately, with completion scheduled for the spring of 1964. A jointly-owned company will build the plant, which will be geared to turn out 150,000 tons ammonia yearly.

Fisons will construct another plant nearby to convert the ammonia to nitrogen products. The two facilities connected by pipeline will go on stream concurrently.

Esso Petroleum, an affiliate of Standard Oil Co. (New Jersey), will be responsible for operating the plant.



FACE FLIES SPREADING — In less than 10 years, when they first were found on Long Island, N.Y., face flies have made a rapid movement West and South, as shown by shaded areas in the USDA map. Latest reports (since preparation of this map), show a light infestation in Kentucky and heavier population in Tennessee.



HIS BUSINESS IS MAKING YOUR BUSINESS BETTER

He's one of several hundred Cyanamid people who mine, process, research, deliver and service phosphatic materials for your acidulation and mixed fertilizer business. These people put Cyanamid's more than 40 years of phosphate experience into the kinds of products and services you can use.

Services you can use

Traffic Service: Cyanamid traffic specialists are ready to route and ship your orders without delays. Their knowledge can save you money, and can make your operation run even more efficiently.

Technical Service: Cyanamid's staff of technical experts are constantly at your service. Make your formulation and production problems theirs. That's their job.

Sales Service: Cyanamid sales representatives are available to work with you and for you in expanding present markets or in establishing new markets.

Products you can use

Cyanamid's phosphate business is the mining and manufacturing of the highest quality products for your mixed fertilizer requirements.

- Florida Natural Phosphate Rock
- TREBO-PHOS*—Triple Superphosphate
- Phosphoric acid — an economical source of P_2O_5 for high analysis fertilizers

American Cyanamid Company, Agricultural Division, New York 20, N. Y. *TREBO-PHOS is American Cyanamid Company's trademark for its triple superphosphate.*

CYANAMID
PHOSPHATE PRODUCTS

CYANAMID SERVES THE MAN WHO MAKES A BUSINESS OF AGRICULTURE

FERTILIZERS

Continued from page 11

ported under that classification. Exports during the first five months of 1960-61 were about 3½ times those of last year; prospects for the last half of 1960-61 indicate urea exports for the whole year will be about double those of a year ago.

Increased production of ammonium phosphates, nitric phosphates and ammonium nitrate-limestone is expected to raise other unspecified solid nitrogen carriers 16% over last year.

Anhydrous ammonia capacity continues to grow through expansion of existing plants and construction of new ones. About 453,000 tons of N capacity will be added to the present 4.3 million when six new plants are completed. In addition, a number of other plants are being expanded or have expansions scheduled for over 160,000 tons of N.

Phosphate

Domestic supplies of P_2O_5 for fertilizers in 1960-61 are expected to be 2,842,000 tons, 4% more than in 1959-60 (Table 2).

Supplies from domestic production will go up 5% but imports will show little change and exports will probably be up 15%.

Normal and enriched superphosphate supplies are expected to be down 5% from 1959-60. Exports are likely to drop 25%.

Concentrated superphosphate production will be up over 10%. Heavy exports in the fall are expected to taper off to a 7% increase for the year.

Shipments of ammonium phosphates by primary producers will be up 28% over 1959-60. Imports are expected to be about the same as last year. Exports will probably be more than double those of last year and leave a net gain of less than 40,000 tons of P_2O_5.

Supplies of all other phosphates will increase 11%. Wet-process phosphoric acid production is at a record level—220,000 tons of P_2O_5 over last year. Furnace acid is up 10,000 tons of P_2O_5. Use of phosphoric acid for direct application and in liquid and solid mixed fertilizers in 1959-60 totaled an estimated 170,000 tons of P_2O_5.

A share of the extra phosphoric acid will go into increased production of concentrated superphosphate, ammonium phosphates, and nitric phosphates with some acid available for expansion in direct application and use in mixing plants. Indications are that there is a softening in the non-fertilizer market for furnace acid which will result in additional acid from this source going to the fertilizer industry.

Scheduled construction and expansion in the period 1960-62 (some of which is now on stream) will swell wet-process acid capacity 46% above the Jan. 1, 1960, level of 1,348,000 tons of P_2O_5. Concentrated superphosphate capacity will be increased more than 25% and ammonium phosphate capacity will become nearly double that existing on Jan. 1, 1960.

Potash

Potash supplies for fertilizers in 1960-61 are expected to total 2,486,000 tons of K_2O, up 4% over 1959-60 (Table 3).

Domestic deliveries of potassium chloride (muriate) to the states during the first half of the year were off 20% from the same period last year. Movement during the spring season is expected to bring the total for the year ahead of 1959-60. Potassium sulfate is expected to be up 4% over last year.

Imports of muriate will be down 10% and potassium sulfate down more than 25% from last year. Mixed fertilizers and other potash carriers are expected to continue at 1959-60 levels.

Even though a record production was attained last year, a record domestic and export movement reduced stocks to 73,000 tons of K_2O on June 30, 1960, whereas stocks had been 473,000 and 261,000 tons, respectively, in 1958 and 1959. Deliveries in 1960-61 must come from current production; hence a seller's market appears to be developing in potash.

Exports of potassium chloride the first five months of 1960-61 were 76% larger than the same period in 1959-60. The rate during the remainder of the year may have to be decreased materially because anticipated needs at home are nearly equal to current production. As a result, exports for the year are likely to be reduced to 11% below 1959-60. World supplies reportedly have been reduced by a slowdown strike at French mines and by a mechanical breakdown at a Spanish mine. Because of the world supply situation U.S. producers have a more favorable export market but may not be able to take full advantage of it because of domestic needs.

Three producers have expansions underway. One producer is building a plant in Utah, scheduled for completion in late 1962, that will increase U.S. potash production capacity over 25%.

The first potassium nitrate plant in the U.S. directed to the fertilizer market is scheduled on stream in late 1961.

Bringing two facilities in Canada into production will add 760,000 tons of K_2O capacity to potash facilities in North America.

TABLE 2—Phosphate: Estimated Supply of P_2O_5 for Fertilizer Purposes, 1959-60 and 1960-61, U.S. and Possessions

(1,000 short tons of available P_2O_5)

Item	1959-60*	1960-61
Supply from domestic sources:		
Normal and enriched superphosphate	1,329	1,264
Concentrated superphosphate	916	1,019
Ammonium phosphate†	232	298
All other‡	351	384
Total	2,828	2,965
Imports:		
Ammonium phosphate	56	56
All other	26	25
Total	82	81
Exports:		
Normal superphosphate	36	27
Concentrated superphosphate	112	120
Ammonium phosphate	20	48
All other	9	9
Total	177	204
Net domestic supply	2,733	2,842

*Revised.

†Liquid and solid ammonium phosphate shipped as such by primary producers.

‡Includes ammonium phosphate (produced in combination with potash salts to make mixed fertilizers), nitric phosphates, sodium phosphate, wet base goods, calcium metaphosphate, natural organics, phosphate rock and colloidal phosphate, basic slag and estimates of wet and furnace phosphoric acid for liquid and solid mixed fertilizers and direct application.

TABLE 3—Potash: Estimated Supply of K_2O for Fertilizer Purposes, 1959-60 and 1960-61, U.S. and Possessions

(1,000 short tons of K_2O)

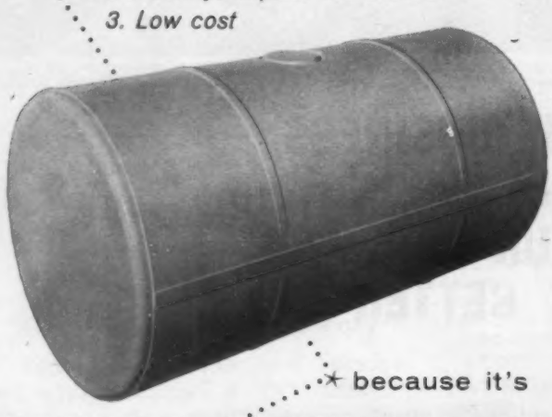
Item	1959-60*	1960-61
Supply from domestic sources:		
Potassium chloride	2,383	2,455
Potassium sulfate†	127	132
All other	20	20
Total	2,530	2,607
Imports:		
Potassium chloride	219	200
Potassium sulfate†	39	28
All other	24	25
Total	282	253
Exports:		
Potassium chloride	395	350
Potassium sulfate†	15	15
All other	8	9
Total	418	374
Net domestic supply	2,934	2,486

*Revised.

†Includes sulfate of potash-magnesia.

This tank offers you all three . . .

1. Resistance to chemicals and weathering
2. Durability, impact resistance
3. Low cost



because it's

MOLDED FIBER GLASS

Terrific for a variety of farm uses, this 200 gallon MFG tank will outlast metal many times over. Won't rust, corrode or deteriorate even in severe weather and exposure. Costs considerably less than stainless steel.

Lightweight, sturdy and strong, it's translucent so you can see level of contents inside. Easy to handle and easy to clean. It's available for immediate delivery, either assembled or knocked-down.

Unaffected by most insecticides, chemicals and liquid fertilizers, liquid or dry, this MFG tank is ideal as a spray tank, portable water tank or storage tank.

Weighs 55 pounds; measures 59" x 32". Write for detailed information.

MOLDED FIBER GLASS BODY COMPANY

4643 Benefit Avenue • Ashtabula, Ohio

SAFETY TROPHY—The Brea (California) plant of Collier Carbon and Chemical Corp. was recently awarded a "Sweepstakes Trophy" by the National Safety Council for having the finest safety program and one of the lowest accident rates of 668 western manufacturing plants of comparable size. Announcement of the honor was made at the group's annual banquet. J. W. Buddenberg, at right, superintendent of Collier's Brea plant, accepted the trophy from J. T. Blalock, president. Companies entered in the contest employ a total of more than 700,000 persons, who worked an estimated 1.4 billion man hours during 1960. The 1960 safety records of these contestants represent a reduction of 5,149 accidents below the 1959 figure and a savings of more than $11 million to industry.

Firm Producing New Types of Bags For Automated Age

NEW YORK—West Virginia Pulp and Paper Co. has under way a program for developing a "whole new family of packaging products," each tailored to perform efficiently in an automated, mass distribution age.

This program has been stepped up in the past year as the result of new trends developing in nearly every field based on automation in production, handling, warehousing and distribution. These trends include bulk loading and palletizing and the development of mass consumer sales directly from from shipping containers and vending machines. They include the development of packages that lend themselves to coding to permit automated handling.

New packaging being developed by West Virginia has been and is being designed to meet the exacting requirements in these many fields. In broad terms, these packages are lighter, stronger containers and wrappers which lend themselves to palletizing and bulk loading. At the same time, these new packages are said to give the designer more scope and surface for type and color to make packages more attractive.

The sweep of West Virginia's packaging program covers new container-type bags and boxes for the shipment of both bulk and packaged products.

A number of its newly-designed packages are expected to be in commercial production as soon as present tests under actual distribution conditions are completed, the company says. Others have been put through the testing stage and are now in production.

West Virginia's packaging program is a total program which envisions the need for packages to meet a mass distribution trend enveloping not only manufacturing industries but also the retail trade.

New Fertilizer Facility Planned in Mississippi

VERONA, MISS.—Plans for location of a new liquid fertilizer manufacturing operation near here have been announced.

The new plant is Southeastern Liquid Plant Food Co. and is part of a new liquid fertilizer operation being opened by DeWitt Walcott, Jr., of Greenville. Two similar plants are to be located in Alabama, one near Mobile. Other Mississippi plants of the Walcott firm are located at Yazoo City, Bobo and Greenville, Miss. Additional plants are located in Arkansas and Louisiana.

Officials said the new plant, costing some $500,000, will be privately financed. The plant will be located on a 15 acre site south of Verona. An access to Highway 45 will be constructed.

The plant will manufacture a complete liquid fertilizer in addition to all necessary equipment. Among items to be manufactured in Verona are liquid fertilizers, herbicides, insecticides and industrial chemicals as well as tanks, applicators and other equipment.

The new firm will initially employ 20 men on a year around basis with employment reaching 40 in peak season.

Company officials said once the access road is completed, the firm will begin moving in machinery immediately. Full production is expected by fall.

NEW EXPORT MANAGER

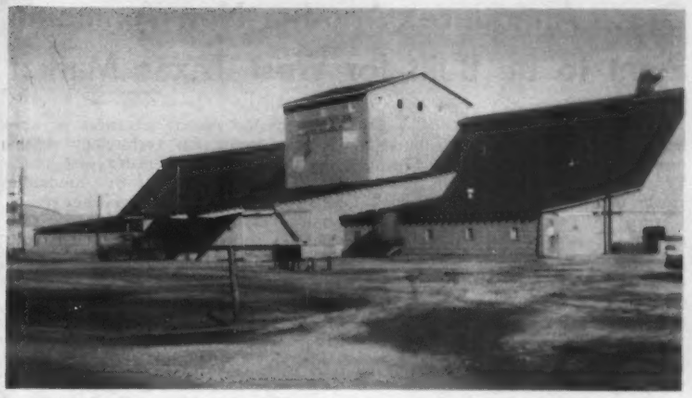
CICERO, ILL.—Ignacio Velazquez has been appointed export manager of Industrial Filter & Pump Mfg. Co., Cicero, Ill. The announcement was made by James F. Zievers, president of the firm's subsidiary, the Foreign Sales Division Inc.

Spencer's Earnings Show Increase Over Last Year

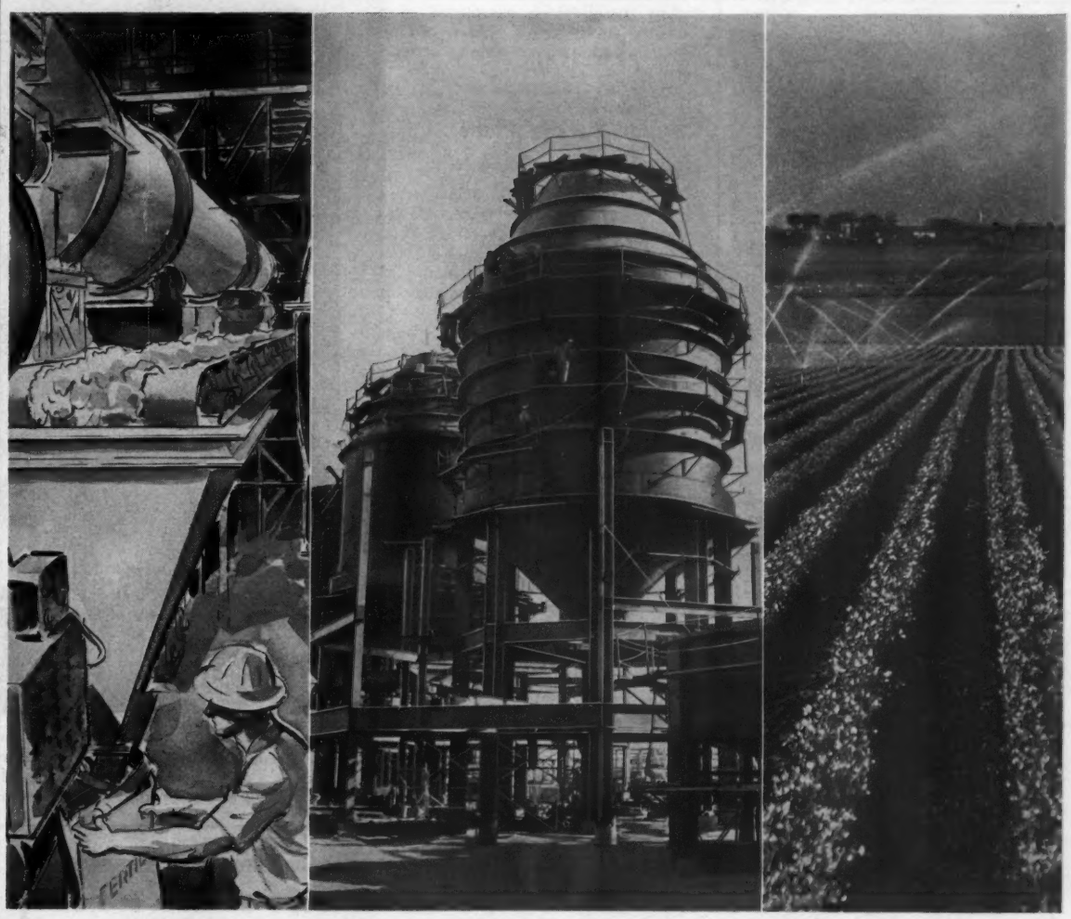
KANSAS CITY, MO.—Increased profits from an active third quarter for Spencer Chemical Co. resulted in earnings for the nine months ended March 31, 1961, ahead of those in the same period a year ago.

Consolidated net sales for the third quarter ended March 31 reflected a 26% increase and totaled $19,551,123, compared with $15,501,556 a year earlier. For the nine months, volume amounted to $52,950,201, up from $48,215,752 a year before, the company reports.

Net income for the three months ended March 31 was $1,577,822, equal to 53¢ a common share, after preferred dividends, compared with $880,594, or 27¢ a share, a year earlier.



NEW FACILITY—Davison Chemical Co., division of W. R. Grace & Co., recently purchased the above fertilizer manufacturing facilities at Wichita, Kansas. The building, 100 ft. by 240 ft., is situated on a site about five acres in area. It was formerly owned by Wichita Fertilizer Co. A variety of fertilizer grades will be offered at the new facility, including high analysis grades produced for the Kansas area by Davison's plant at Joplin, Mo.



3-WAY BOOST IN POTASH

INCREASED PRODUCTION OF TRONA® MURIATE WILL SOON MEAN BETTER SERVICE...BETTER MIXED FERTILIZERS...HIGHER YIELDS OF QUALITY CROPS

Increased production of Muriate of Potash at Trona will be measured in three-way benefits. Expanded potash facilities, shown above, will soon make available from AP&CC more tonnage of free-flowing, uniform granule size Trona potash in granular and regular grades for agriculture's expanding needs. To the mixer, more quality potash from Trona will mean a better finished product... and to the grower, higher yields of quality crops.

TRONA® American Potash & Chemical Corporation

3000 W. SIXTH STREET, LOS ANGELES 54, CALIFORNIA
99 Park Ave., New York 16, N.Y.
Other Sales Offices: Chicago • San Francisco • Portland (Ore.) • Atlanta • Columbus (O.) • Shreveport

Grace Announces Another New Ammonia Plant to Be Built for West Texas Market

NEW YORK—W. R. Grace & Co. has announced that it will build a new ammonia plant in Big Spring, Texas, to supply fertilizer to the agricultural area of west Texas.

William J. Haude, president of Grace's nitrogen products division, said the plant will be producing early next year and is expected to produce in excess of 60,000 tons of ammonia annually. Foster Wheeler Corp., New York, will design and construct the plant.

Mr. Haude said the new plant will adjoin the Big Spring, Texas, oil refinery of Cosden Petroleum Corp. and will be operated for Grace by Cosden. Grace owns 53% of the outstanding stock of Cosden.

Mr. Haude said the new plant will employ the recent advances in ammonia production technology developed by Foster Wheeler and practiced by Grace at its five ammonia installations. He added the major market for the ammonia will be as fertilizer directly applied to the soil.

News of the new plant follows by only a few weeks a Grace announcement of completion of increased ammonia production of 60,000 additional tons at one of its two ammonia producing facilities at Memphis, Tenn.

In addition to Big Spring, Texas and Memphis, Tenn., Grace holds a 49% interest in an ammonia plant in Puerto Rico and another in Trinidad, B.W.I. Caribe Nitrogen Corp. manages the Puerto Rican plant while Federation Chemicals, Ltd., manages the one in Trinidad, B.W.I.

Grace now has five ammonia-producing installations completed over the last seven years. Three of the five installations have gone on stream since 1959.

SPRAYING SYSTEMS
SPRAY NOZZLES
and related equipment
for better lower cost farm spraying
TeeJet®
SPRAY NOZZLES
For uniform spray distribution and exact volume control.
BoomJet®
SPRAY NOZZLES
For spraying grains and grasses... and liquid fertilizers.
ACCESSORIES FOR BOOM AND HAND SPRAYERS
Split-Eyelet Connectors
Diaphragm Pressure Relief Valves
DirectoValve
Most components in choice of brass, aluminum, Nylon and stainless steel for all spraying needs.
GunJet Spray Guns
For complete information write for Catalog 38
SPRAYING SYSTEMS CO.
321 N. Randolph, Bellwood, Ill.

Copper Sulfate Plant Completed in Canada

WINNIPEG, MAN.—The second stage of an industrial chemical complex in Manitoba has recently been completed with the construction of a $250,000 copper sulfate plant at Transcona, Man., six miles east of here.

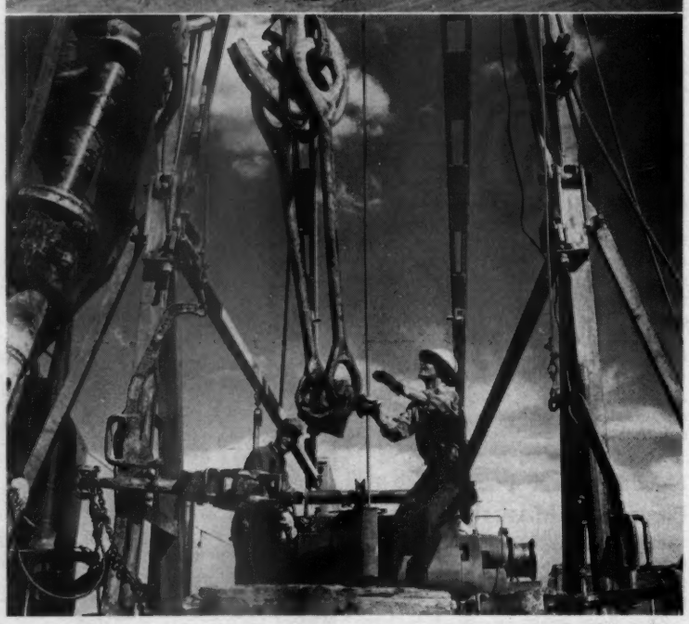
Border Chemical Co., Ltd., built the plant, assisted by a loan from the Manitoba government. The company last summer opened the province's first sulfuric acid plant nearby. A third related chemical plant is planned.

The copper sulfate plant will reach production of 6 000,000 lb. a year, the company president, Mark Schmerchanski, said. It will have a staff of eight.

The copper sulfate will be manufactured by combining sulfuric acid from the first plant with metallic copper mined at Flin Flon, Man.

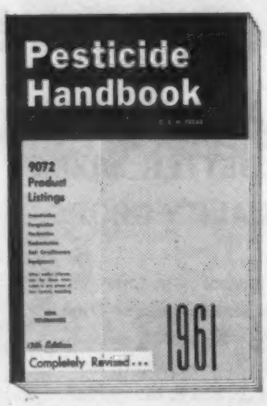
The sulfate is used in insecticides, herbicides, wood preservatives, fertilizers, and in a number of industry processes.

Croplife *Want Ads... Get Results*



POTASH SCENES—Work on developing new potash reserves in Utah is being continued by Texas Gulf Sulphur Co. Above are scenes from the operation at Cane Creek near the town of Moab in southeastern Utah. TGS has announced a multi-million dollar program for mining and processing facilities in the area and will produce potash in large quantities later. Top photo is general scene of drilling, while lower shot is closeup of men at work in one of the initial stages of the program. TGS says that it will have invested some $25 million before the first ton of potash is available for sale. The mine shaft itself will have an inside diameter of 22 ft. and will extend downward nearly 3,000 ft. A 14-mile all-weather road will be constructed by the Utah Highway Department, and a 37-mile rail spur connecting the mine with the Denver & Rio Grande Western Railway will be constructed. The rail spur, incidently, will include a 7,000-ft. tunnel.

NOW REPORTING ON 9,072 TRADE NAMES



NEW EDITION NOW AVAILABLE

AN IMPORTANT BOOK FOR THOSE INTERESTED IN ANY PHASE OF PEST CONTROL

County agents, extension and research specialists, manufacturers, salesmen, jobbers, dealers, purchasing agents, health officers, farmers and librarians have found this publication to be extremely useful time and time again. **Pesticide Handbook** is the ONLY book giving complete up-to-the-minute information on over 9,000 commercial products, completely indexed by trade names, active ingredients and manufacturers.

at your fingertips—

You'll find a wealth of information on fungicides, insecticides, rodenticides, adjuvants, diluents, compatibilities, antidotes, and pest control equipment. New tolerances are listed.

about the editor—

Dr. Donald E. H. Frear, Editor of PESTICIDE HANDBOOK 1961, is one of the leading authorities on the chemistry of pesticides. He is the author of "Chemistry of Insecticides and Fungicides," the first book dealing with this subject published in the United States. In addition, he has written several other books, including "Chemistry of Insecticides, Fungicides and Herbicides." Dr. Frear is Professor of Agricultural and Biological Chemistry at the Pennsylvania State University.

2.00 280 Pages
Cloth Bound Edition ea. $3.50
Postage included on prepaid orders

Send Today
PESTICIDE HANDBOOK
P.O. Box 798
State College, Pennsylvania

New Blending Plant by Western Farmers' Group

OTHELLO, WASH. — Western Farmers Assn. has started construction on a $100,000 fertilizer plant to be located across the highway from the firm's present site at Othello. The new bulk dry fertilizer distribution and blending plant is planned to serve the Columbia basin. It was to be completed in time for this spring's use.

The facility will blend dry fertilizer ingredients into formulas required for individual soils in the area. Complete mixtures will be produced in bulk or can be bagged for distribution.

MOSAIC DISEASE HITS ILLINOIS WHEAT

URBANA, ILL.—Serious outbreaks of Mosaic disease in wheat struck wide areas of central and south central Illinois early in May. The disease was found in many counties never before having an outbreak. It is believed to be the most serious in more than 15 years.

M. P. Britton, University of Illinois plant pathologist, says the disease is caused by a virus present in the soil at all times. But the long, cool spring and high moisture conditions in March and April are responsible for the heavy damage reported this year.

How much yields will be cut is hard to say at this time, Mr. Britton points out. Farmers who have the disease in their fields were advised to check it closely after the weather warms up to see if the crop is worth saving.

Georgia Plant Food Group Plans June 6-7 Meeting

SAVANNAH, GA.—Plans are complete for the 1961 summer meeting of the Georgia Plant Food Educational Society, scheduled to convene at The Wanderer Motel, Jekyll Island, Ga., June 6-7.

According to Lee DeYoung, Savannah, secretary, the meeting agenda will include a talk on the history of the society, by Dr. J. Fielding Reed, southern director, American Potash Institute. "Prospects for College Graduates in Agriculture," by Robert Wheeler, director of instruction, College of Agriculture, University of Georgia, and "Future of Agriculture," by George H. King, director, Georgia Agricultural Experiment Stations, will also be on the agenda.

"The Fertilizer Industry, Past, Present and Future," will be reviewed by Dr. Sam Tisdale, The Sulphur Institute.

California Plans Hearing On Sodium Arsenite Use

SACRAMENTO, CAL.—A public hearing on proposed amendments to the California State Department of Agriculture's regulations governing "hazardous chemicals" is scheduled for Thursday morning, May 18. The hearing will bring up the proposal of adding sodium arsenite, herbicide, to the list of materials subjected to special restrictions.

The department proposes (1) to allow use of sodium arsenite only after a proper permit has been obtained, (2) to regulate its application to soil or vegetation, (3) to prohibit anyone from placing sodium arsenite in drinking cups, beverage bottles or other containers of the type commonly used for foods or beverages, or placing the chemical in any unlabeled containers.

New Liquid Plant in Idaho Begins Operations

MOSCOW, IDAHO—Latah County Grain Growers, Inc., of Moscow have placed their $60,000 liquid fertilizer storage plant in operation.

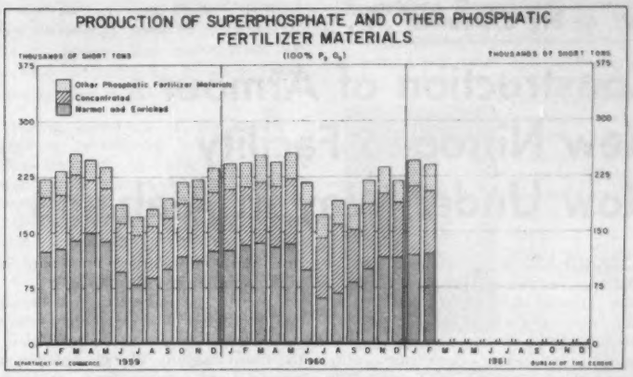
The 67,000-gal. facility is equipped to dispense all types of commercial liquid fertilizers. Tanks are located in a six foot deep concrete encased pit equipped with drainage. Fred Cann, manager, said the pit was constructed primarily as a safety feature. In the event one of the tanks should burst, the pit has sufficient capacity to carry off the fertilizer through the drainage system.

The tanks contain various solutions which can be mixed according to soil analysis needs. "We are in a position to pump as much as 75,000 to 80,000 gal. of fertilizer a day," Mr. Cann said.

Atlas to Merge with Pharmaceutical Firm

WILMINGTON, DEL.—Shareowners of Atlas Powder Co. on April 25 approved the company's proposed merger with The Stuart Co., a pharmaceutical manufacturer and distributor. The Atlas board of directors shortly will take formal action on the merger, expected to be made effective on or about May 31, 1961.

Atlas President Ralph K. Gottshall told shareowners during the annual meeting that Arthur Hanisch, president of Stuart, had reported Stuart shareowners also had voted for the merger at a special meeting in Pasadena, Cal. When the merger is effected, Atlas will change its name to Atlas Chemical Industries, Inc., and will split its common stock, four-for-one. Mr. Gottshall said the new name "more accurately characterizes the growing diversity of our operations."


PRODUCTION OF SUPERPHOSPHATE AND OTHER PHOSPHATIC FERTILIZER MATERIALS
THOUSANDS OF SHORT TONS
(100% P_2O_5)
Other Phosphatic Fertilizer Materials
Concentrated
Normal and Enriched
375
300
225
150
75
0
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
1959
1960
1961

SUPERPHOSPHATE PRODUCTION—Figures released recently by the U.S. Department of Commerce indicate that output of superphosphate and other phosphatic fertilizer materials during February, 1961, was slightly below that of the same month of 1960. The figures were 240,054 tons and 242,513 tons, respectively. Shipments, however, were up about 1%, and stocks held by producing plants as of Feb. 28, were 3% less than those held on Jan. 31, 1961. Monthly chart above was compiled by USDC bureau of the census.

call for DUVAL
when you want SERVICE and QUALITY

We welcome urgent orders—ship them the same day, when they are received by early afternoon. Constant research, development, and control assure you of the highest quality in potash and sulphur.

DUVAL
• MURIATE OF POTASH
standard and granular types
• SULPHUR
lump and molten

Produced by
DUVAL SULPHUR & POTASH COMPANY

Exclusive Sales Agent
ASHCRAFT-WILKINSON CO.
ATLANTA, GEORGIA

Norfolk, Va. • Charleston, S. C. • Tampa, Fla. • Jackson, Miss. • Columbus, Ohio • Montgomery, Ala. • Des Moines, Iowa

Part of Big Expansion . . .

Construction of Armour's New Nitrogen Facility Now Under Way in Alabama

CHEROKEE, ALA.—Armour Agricultural Chemical Co., on April 25, broke ground for its new nitrogen plant here. Officials of Armour & Co., representatives of city and state governments, including Governor John Patterson of Alabama, and some 300 others were on hand at the ceremonies.

William W. Prince, Chicago, chairman of the board and chief executive officer of Armour & Co., manned the shovel for the actual ground breaking. E. W. Wilson, Armour president, addressed the group, calling the new Alabama facility a "significant part" of the company's growth.

W. E. Shelburne, Atlanta, president of Armour Agricultural Chemical Co. and vice president of Armour & Co., was master of ceremonies.

The new fertilizer complex is part of a $60 million expansion program being undertaken by Armour. In addition to the new facilities in Alabama, the program includes a phosphate plant near Fort Meade, Fla.

Construction of the Armour nitrogen plant in Alabama is being financed by the town of Cherokee under terms of a $25 million bond issue said to be the largest of its kind in the nation. When completed, the plant will be leased to and operated by Armour Agricultural Chemical. The company says this complex will be the largest facility of its kind in the country, comprising six different manufacturing plants on the one 1,200-acre site, using common sources of power, water and natural gas. Tons-a-day capacities of the six plants will be ammonia, 360; urea, 50; nitrogen solutions, 250; nitric acid, 300; ammonium nitrate, 250, and ammonium phosphate, 500.

Appreciable quantities of ammonium phosphate base, high-analysis mixed fertilizers will be produced by the plant system. The phosphoric acid supply will come from the new Armour plant in Florida.

The project is scheduled for completion during the first quarter of 1962, and employment during the construction period is expected to reach a peak of 1,800. The completed facility will provide jobs for some 250 persons.

On the site the plant complex will have two miles of new roadway and three miles of railroad trackage. The Southern Railway will build a four-mile spur from Cherokee to the site. Altogether, the plant group will occupy a fenced area of approximately 100 acres.

The M. W. Kellogg organization, coordinator for the entire project, will engineer, procure materials for, and construct the ammonia and urea plants. It will also be responsible for the construction of all off-site facilities.

The Chemical & Industrial Corp., Cincinnati, Ohio, has the contract for engineering - procurement - construction of the nitric acid, nitrogen solutions and ammonium nitrate plants, while Chemical Construction Corp., New York, is handling the work for the ammonium phosphate plant.

In addition, a new substation will be built on the grounds by the Tennessee Valley Authority.

Armour officials said that besides the new projects in Alabama and Florida, and other expansions, the company will also continue an extensive modernization program for existing fertilizer mixing plants. There are 34 of these plants located in the United States, and one in Puerto Rico.

The company's plants in the United States are located in Albany, Augusta, and Columbus, Ga.; Baltimore, Md.; Birmingham and Montgomery, Ala.; Carteret, N.J.; Chicago Heights and East St. Louis, Ill.; Cincinnati and Sandusky, Ohio; Columbia, S.C.; Dallas and Houston, Texas; Davenport and Jacksonville, Fla.; Greensboro and Wilmington, N.C.; Jefferson, Ind.; Memphis and Nashville, Tenn.; New Orleans, La.; Norfolk, Va.; Kansas City, Mo.; Owosso, Mich.; Belmond, West Union, Sanborn, Vinton, Jefferson, and Waterloo, Iowa; and Blue Earth, Willmar and Winona, Minn. Armour Agricultural Chemical Co. also has a nitrogen plant located at Crystal City, near St. Louis, Mo.

General offices of the company, which is one of the six divisions of the Armour Chemical Industries, are located in Atlanta.

An interesting aspect of the current $60,000,000 expansion program is that when it is completed in 1962 the chemical industries part of the Armour organization will for the first time represent more investment than the total for abattoirs and meat-producing facilities of the parent firm.

NEW FACILITY — Above is architect's drawing of new nitrogen fertilizer facilities now under construction at Cherokee, Ala. Ground-breaking ceremonies, held April 25, were attended by officials of Armour and dignitaries of state and local governments. At left, taking part in ground-breaking, are, left to right, E. W. Wilson, Chicago, president of Armour & Co.; Gov. John Patterson of Alabama, and William Wood Prince, Chicago, chairman of the board and chief executive officer of Armour & Co.

The new plant, said to be the largest of its kind in the country, is scheduled for completion in the first quarter of 1962.

AMMO-NITE®
BAY-SOL®
ESCAMBIA CHEMICAL CORP.
EXCLUSIVE SALES AGENTS
ASHCRAFT-WILKINSON CO.

International Container Firm Is Established

BIRMINGHAM, ALA.—Formation of a new company for overseas management and manufacture was announced here recently. Gordon D. Zuck, president, said the new company will be known as Vulcan International, S.A. with headquarters in Panama City, Panama. Representative offices will be located in Birmingham, Ala., River Forest, Ill., and in New York City.

Mr. Zuck said the new company will operate steel pail and drum manufacturing plants at selected locations in foreign countries.

Officers, in addition to Mr. Zuck, president, include Vern I. McCarthy, Sr., chairman of the board of directors; Fred A. Kusta, executive vice president; Vern I. McCarthy, Jr., treasurer; Paul H. Oberholtzer, secretary; and D. L. McCarthy, assistant secretary.

Sales, Gross Profits Up For U.S. Borax & Chemical

LOS ANGELES—United States Borax & Chemical Corp. on May 1 reported slightly higher sales and improved gross profit for the six months ended March 31, 1961, although net income was reduced.

In the quarterly report mailed to shareholders, Hugo Riemer, company president, disclosed that net earnings for the first half of fiscal 1961 amounted to $2,732,718, equivalent after preferred dividend requirements to 58¢ share on the 4,196,415 shares of common stock outstanding.

Agricultural Engineers to Hear Secretary June 27

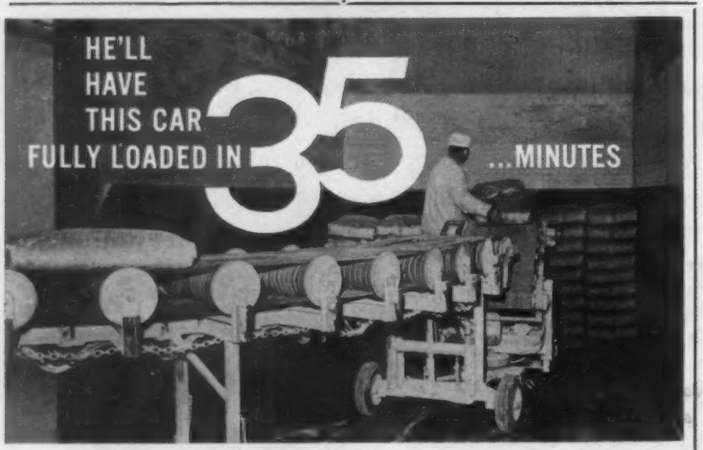
AMES, IOWA — Orville Freeman, Secretary of Agriculture, will speak on "New Frontiers" in agriculture at the 54th summer meeting of the American Society of Agricultural Engineers in Ames, June 27. It will be a major Midwestern appearance for the Secretary, according to the program committee. Meeting sessions will be at the Iowa State University Armory.

More than 120 technical papers will be presented, covering the four major areas of agricultural engineering: power and machinery, farm structures, electric power and processing, and soil and water.

Pacific Entomologists Plan June Convention

SANTA BARBARA, CAL. — The Pacific Branch of the Entomological Society of America will conduct a three-day meeting at the Miramar Hotel, Santa Barbara, June 20-22, according to H. H. Keifer, Sacramento, secretary.

H. T. Reynolds, University of California, Riverside, program chairman, states that in addition to submitted papers to be presented at the meeting, a number of invitational papers and symposia are also being arranged. These will include discussions on recent changes in international rules of nomenclature; biological and chemical studies of mite resistance; relation of spray deposits to plant surfaces and insect control; and physical aspects of insecticides and their relation to application techniques.



...without help, using a
POWER-CURVE Loader

Bag loading costs of eight cents a ton are not uncommon in plants using Power-Curve equipment. One man loads and stacks direct from the packer with no need to lift a single bag. Loads can be palletized or stacked in any pattern, also put into warehouse storage.

There are Power-Curve installations near you. Let us show you how your plant can benefit from a custom engineered Power-Curve loading operation.

Literature and engineering details sent on request.

POWER-CURVE
CONVEYOR COMPANY
2185 SOUTH JASON ST., DENVER 23, COLORADO

Sulphur Institute to Launch Agricultural Research, Educational Program in 1961-62

LONDON—The one-year-old Sulphur Institute will put into full operation in 1961-62, its research and educational program dealing with new and expanded uses for sulphur in all its forms in industry and agriculture, it was announced here May 8 by Dr. Russell Coleman, president.

Dr. Coleman's announcement followed approval by the membership of the proposed budget for 1961-62, and a dues rate for members to support the proposed budget. The annual meeting of the membership, and meetings of the board of directors and the executive committee were held in London.

Although some research was begun during the current year, the 1961-62 budget provides for a variety of projects to be conducted by public and private research organizations in many parts of the world, particularly in Europe and the U.S.

In addition to certain fundamental studies, considered vital to the success of applied research in the planning stage, the institute's industrial research program will concentrate in the areas of fertilizer technology and the use of sulphur in other industries.

In the agricultural area, the studies will deal primarily with the use of sulphur as a plant nutrient. A number of projects are slated to assess the sulphur needs of soils in various areas of the world, including Europe, the U.S., South America, Australia and India. Also to be studied is the role of sulphur in tropical oil crop production. Other investigations will have as their aim the development of suitable soil and tissue tests to help predict sulphur needs of crops.

Economic studies will be a part of the industrial and agricultural research programs. In addition, the 1961-62 budget will permit the institute to continue its support of the program of the Food and Agriculture Organization of the United Nations to increase fertilizer consumption in underdeveloped areas of the world. This program is a part of FAO's "Freedom From Hunger Campaign." Also slated are studies of the economics of fertilizer manufacturing processes and of probable trends during the next five years.

In its educational program, the institute will concentrate during the coming year on developing a center for technical and scientific information relating to agricultural and industrial uses of sulphur in all its forms. The publication of certain educational booklets and leaflets also is planned.

Among members of the board of directors re-elected to three-year terms expiring in 1964, were two Americans: Milton Lewis, Hancock Chemical Co., Los Angeles, and R. C. Wells, Freeport Sulphur Co., New York. Americans re-elected to the institute's executive committee were: C. O. Stephens, Texas Gulf Sulphur Co., New York; H. C. Webb, Pan American Sulphur Co., Houston; C. A. Wight, Freeport Sulphur Co., New York, and Dr. Russell Coleman, president of the institute, Washington, D.C.

Dr. Coleman and the other officers were re-elected. These included Dr. Rene Leclercq, vice president, Europe; Dr. Samuel L. Tisdale, secretary, and Dr. M. S. Williams, treasurer.

Southern Representative

WILMINGTON, DEL.—Norman R. Downey has been appointed by Hercules Powder Co. as district manager for agricultural chemical sales in Florida, Georgia, Alabama, and most of Tennessee, according to Richard T. Yates, sales director for agricultural chemicals for Hercules.

Norman R. Downey

Mr. Downey has been with Hercules since 1942 and in his most recent assignment, served as senior technical representative for agricultural chemicals. He was graduated from the University of Tennessee in 1937 with a bachelor of science degree in mechanical engineering. With Hercules, he has been associated with the sale of toxaphene and Delnav.

Algerian Phosphate Plant Being Built

ALGERIA—Construction work has begun on the $25 million Djebel-Onk phosphate works in northwestern Algeria, according to information coming out of that country. Total reserves of phosphate are estimated at around 500 million tons, 20% of which is said to be in open pits.

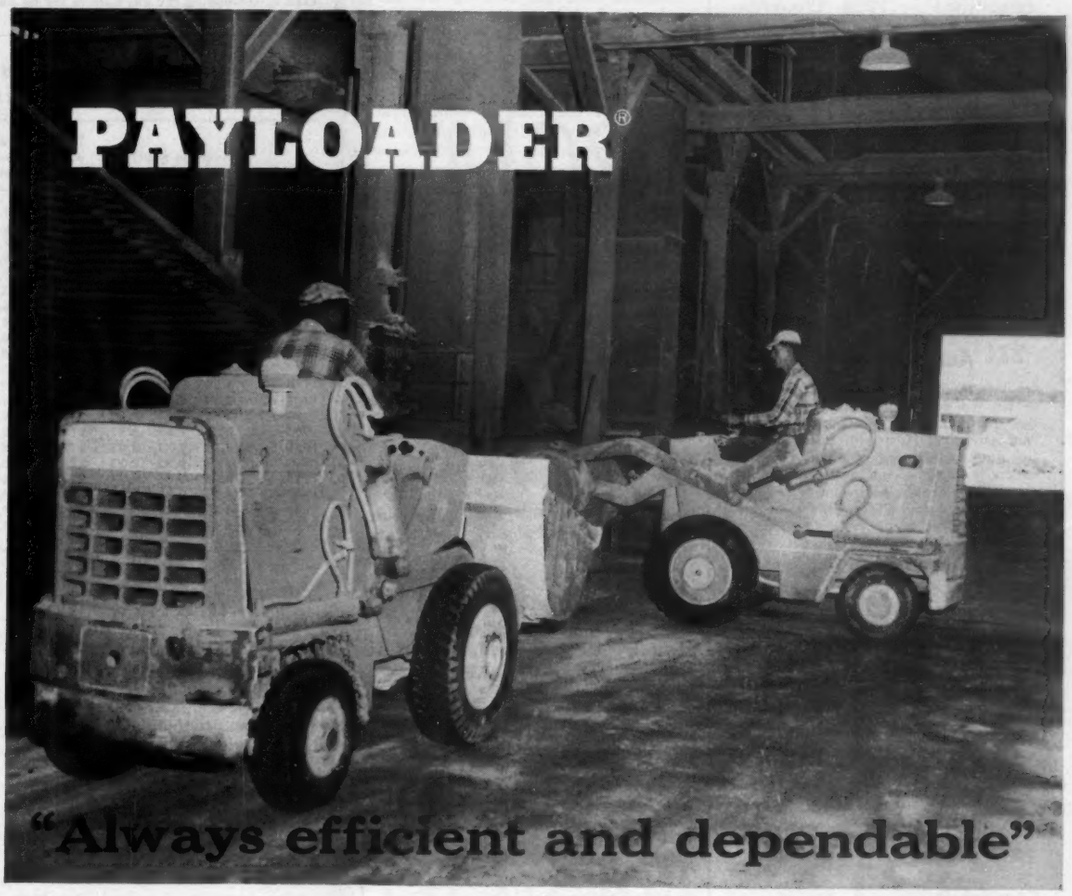
The new plant is expected to have turned out its first 50,000 tons of 75% phosphate product by the end of 1962, and by 1964, production is expected to reach 800,000 tons a year.

The Société d'Exploitation du Gisement de Phosphate de Chaux du Djebel-Onk, jointly owned by the state and private interests, will mine the deposits. Major shareholder is Compagnie des Phosphates de Constantine, with 40% of the new firm's $6 million capital; the French Government holds 34% through two agencies. Most of the remaining shares are held by Algerian development groups.

The raw ore, no richer than 50% in content, will be treated through to the roasting process at Djebel-Onk and taken to Bône on the Mediterranean, 210 miles north, to be washed, dried and readied for shipment. The treatment plants will cost $8 million and laying an electrified rail line from Djebel-Onk to Tebessa an additional $9 million.

Award Presented

COLLEGE PARK, MD.—Mark Edgar III, W. Hyattsville, Md., was the recent recipient of the National Plant Food Institute agronomy achievement award scholarship of $200. Dr. W. H Garman, NPFI chief agriculturist, presented the cash scholarship to Mr. Edgar along with a gold key to mark the occasion at a meeting of the University of Maryland Agronomy Club. Mr. Edgar will also have his name inscribed on a plaque for displaying a permanent record of the yearly winners of this honor.



"Always efficient and dependable" . . . says J. E. Fortner, President of Citrus Culture Corporation referring to their many years of experience with PAYLOADER tractor-shovels. "At our new plant we now have three modern H-25 PAYLOADER units. Their greater [2,500-lb.] capacity, faster cycles and easier operation give us more productive capacity so that we can render better, faster service to our customers during the peak season."

Citrus Culture Corporation of Mount Dora, Florida, is a producer of custom blended fertilizers particularly for the citrus and vegetable growers in the area. It has used PAYLOADER tractor-shovels for many years to unload box cars, charge elevators and feed baggers.

Their present PAYLOADER equipment consists of three model H-25 units that feature power-shift transmissions, power-steering and other improvements. The oldest of these has operated 2,400 hours and has only required routine maintenance and adjustments. They credit this fine record not only to superior basic design but also to the extra protection against dust and dirt built into the machine — the special air filtering and oil filtering plus the many grease and oil seals provided.

Your Hough Distributor wants to show you what the H-25 or one of the larger PAYLOADER models can do on your bulk-handling work. See him soon, or return the coupon.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

HOUGH, PAYLOADER, PAYMOVER, PAYLOGGER, PAYLOMATIC and PAY are registered trademark names of The Frank G. Hough Co.

THE FRANK G. HOUGH CO., 970 Sunnyside Ave., Libertyville, Ill. 5-A-1

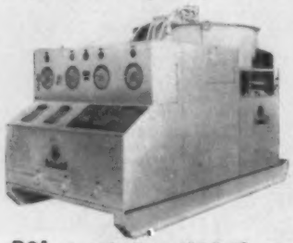
Send "Industrial Material Handling from A to Z"

NAME
TITLE
COMPANY
STREET
CITY STATE

"WE BOUGHT B&L EQUIPMENT WITH BOTH OUR BUDGET AND FUTURE NEEDS IN MIND"

Says: THOMAS O. COCHRANE
Secretary, General Manager
Crookston Liquid Fertilizer, Inc.
Crookston, Minn.

Established in 1958, Crookston Liquid Fertilizer, Inc. today serves Red River Valley farmers within a 150 mile radius of its Crookston, Minnesota plant.



B&L AutobatcH Skid Plant

Leading liquid fertilizer producers have chosen the B&L AutobatcH Skid Plant as the most practical unit available. The AutobatcH Skid Plant with scale-mounted LiqualizeR (illustrated above) combines meters for doing — and scales for checking. Built to handle, automatically, all raw materials used now and in the foreseeable future. Shipped ready for installation.

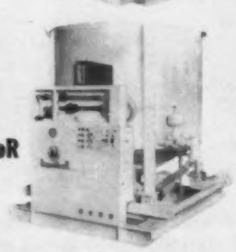
THE B&L LiquibatcheR

A low-cost batch unit featuring semi-automation.

THE B&L ConvertoR

For economical production of aqua ammonia

THE B&L LiqualizeR



Industry's outstanding blending unit with exclusive whirlpool action that insures solubilization.

Pioneers in Neutral Solution Fertilizer Processing Plants
WRITE FOR DETAILS:
CHEMICAL PLANTS DIVISION

Manufacturing Company INC.

Since 1854

1200 12TH ST., S.W. CEDAR RAPIDS, IA.

70-Year Fertilizer Study Shows How Plant Nutrients Continue Increase

By Bruce D. Cloaninger*
Clemson Agricultural College
Clemson, S.C.

CLEMSON, S.C.—The recent end, some years ago, of the "by guess and by gosh" era of fertilizer manufacture ushered in the highly-specialized chemical processes which now characterize the plant food industry. The innovations introduced in late years have included the push-button commercial fertilizer plant, increased the operation capacity per hour, reduced to a minimum the number of persons required to operate plants, and lowered the cost per unit of plant nutrients to the user.

Beyond this, the industry has also made a fertilizer that distributes more uniformly. Theoretically, each particle in the mixture is homogenous and should meet the guaranteed analysis appearing on the package.

Although the cost of commercial fertilizers may seem high, numerous surveys reveal that for every dollar spent for commercial fertilizers, there is a minimum net return of $5 to $7. When one compares the slight increase in fertilizer costs with other items the farmer purchases, he should be most grateful to agricultural scientists and members of the fertilizer industry for their efforts in holding the prices down.

Table 1 shows average plant nutrient content in mixed fertilizer and the commercial values, which incidentally represent the price at the ports less freight, bagging, tagging, etc., for the past 72 years at 10-year intervals.

Note that prices have fluctuated slightly, but for several years have been somewhat uniform. Perhaps fluctuations were caused by war years that directly affected foreign shipments, especially prior to development of certain material-producing plants and mines in the United States.

To show the full picture, Table 2 gives the increase in plant nutrient content of commercial fertilizers over the same period of years.

In 1889, the total plant food content of mixed fertilizers in South Carolina was 11.45% compared to 25.13% for the fiscal year ended June 30, 1960. If South Carolina farmers today used the same low analysis mixtures as in 1889, they would have to use over twice the tonnage to get the same plant food.

Farmers of today just cannot afford to spend money for low analysis mixtures. The increased freight rates, cost of labor, along with other increased expenses, have caused energetic wide-awake farmers to go to higher analyses.

However, as they go to higher analysis mixtures, they must also give attention to the proper placement of these higher analysis mixtures in relation to the seed. Otherwise, the young seedlings will be injured.

Even though research data have been firm on this subject for over 30 years, each year numerous complaints are heard (usually from absentee landlords) that stands of cotton, corn, or tobacco are poor due to improper fertilizer placement. Some of the better farmers applying more than 500 pounds per acre usually broadcast part of the mixture before planting or as the land is prepared.

Modern equipment developed by the manufacturers of farm equipment, in cooperation with college engineers and scientists, now make it possible to apply fertilizer mixtures and materials correctly and economically.

*Abstracted from article appearing in Jan.-Feb. issue, "Better Crops With Plant Food," published by American Potash Institute, Washington, D.C.

TABLE 1—Average Analysis and Total Plant Nutrient Content of Complete Fertilizer and Relative Commercial Values Used in South Carolina for the Periods Shown.

Year	N	P_2O_5	K_2O	Total units plant food	*Relative commercial value per unit		
					Nitrogen	Av. P_2O_5	Sol. K_2O
1888–89	1.81	8.30	1.34	11.45	$3.64	$1.20	$1.00
1897–98	2.22	9.15	1.93	13.30	2.79	.65	.90
1907–08	2.48	9.17	3.01	14.66	4.00	.90	1.00
1917–18	2.54	8.54	2.25	13.33	7.29	1.00	5.00
1927–28	3.07	9.02	3.76	15.85	4.86	.80	.90
1937–38	3.10	8.40	4.60	16.10	1.70	.75	.80
1947–48	4.01	9.86	6.11	19.98	2.90	1.00	1.00
1957–58	4.16	9.93	9.84	23.93	2.20	.90	.90
1959–60	4.37	10.02	10.74	25.13	2.20	.90	.90

*These values represent the average cost values at the ports as reported by the manufacturers. They do not include the price of bagging, handling and freight. The values are used in calculating the payment to the farmer when the analysis indicated a shortage of plant food.

TABLE 2—Average Analysis and Total Plant Nutrients in Mixed Fertilizers Used in South Carolina for the Periods Shown.

Years	Average analysis			Total plant nutrients	Total tons mixed fertilizer	Tons of plant nutrients			Total tons plant nutrients
	N	P_2O_5	K_2O			N	P_2O_5	K_2O	
1939–40	3.55	8.40	4.99	16.94	392,958	13,950	33,008	19,609	66,567
1940–41	3.71	8.25	5.29	17.25	425,461	15,785	35,101	22,507	73,393
1941–42	3.70	8.20	5.29	17.19	467,566	17,300	38,340	24,734	80,374
1942–43	3.07	9.27	6.03	18.37	525,211	16,124	48,687	31,670	96,481
1943–44	3.62	9.55	5.70	18.87	545,563	19,749	52,101	31,097	102,947
1944–45	3.82	9.64	6.65	19.49	545,296	20,830	52,567	36,262	109,659
1945–46	3.80	9.71	6.54	20.05	596,133	22,653	57,885	38,987	119,525
1946–47	3.96	9.86	6.13	19.95	704,653	27,904	64,479	43,195	135,596
1947–48	4.01	9.86	6.11	19.98	680,354	27,282	67,083	41,597	135,962
1948–49	3.88	9.69	6.50	20.07	720,163	27,942	69,784	46,811	144,537
1949–50	3.73	9.68	6.86	20.27	613,019	22,866	59,340	42,053	124,259
1950–51	3.64	9.72	7.31	20.67	679,174	24,722	66,016	49,648	140,386
1951–52	3.62	9.70	7.65	20.97	718,301	26,003	69,675	54,950	150,628
1952–53	3.69	9.73	7.78	21.20	710,322	26,211	69,114	55,263	150,588
1953–54	3.33	9.69	8.11	21.13	672,022	22,378	65,119	54,501	141,998
1954–55	3.71	9.71	8.42	21.84	645,053	23,931	62,635	54,313	140,879
1955–56	3.64	9.92	9.33	22.89	620,921	22,601	61,595	57,932	142,128
1956–57	4.01	9.75	9.33	23.09	565,959	22,995	55,181	52,804	130,680
1957–58	4.16	9.93	9.84	23.93	525,460	21,859	52,178	51,705	125,742
1958–59	4.42	10.49	10.39	25.30	639,975	28,287	67,133	66,493	161,913
1959–60	4.37	10.02	10.74	25.13	578,406	25,293	57,959	62,102	145,354

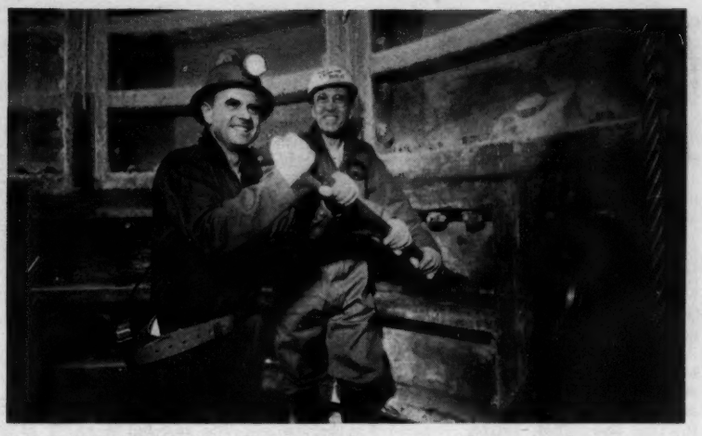
Through the concerted efforts of all agricultural agencies and the fertilizer manufacturers, the number of grades in South Carolina has been reduced from 201 in 1939 to 36 in the year just ended. Incidentally, of these 36 grades, six grades constituted 80% of the tonnage of mixed fertilizers sold last year.

The leading grades in order of the amount sold in 1939 were 3-8-5, 4-8-4, 3-10-3, 5-7-5, 4-8-6, and 4-7-5. The leading grades sold in 1959-60 were 4-12-12, 4-8-12, 4-10-6, 5-10-10, 3-12-12, and 3-9-9 (tobacco only). The 4-12-12 grade constituted 28% of the total tonnage of mixed fertilizer sold. The tonnage for the 4-12-12 grade had increased from 1,737 tons in 1952 to 162,740 in 1960.

The fewer number of grades assists the manufacturer in reducing storage space and cost of production and also enables him to deliver a well-cured drillable product.

It is essential that the fertilizer manufacturer, agriculturist, and farmer revaluate their program or programs to make progress. It has been aptly said that one either goes backwards or forwards. One never stands still. The person with the know-how and the ambition to do better will, as usual, succeed.

FIRE ANT STATUS—At the close of the 1960 season, some 2,459,852 acres in nine southern states had been treated since the beginning of the federal-state cooperative program. Much of the work has been completed in 83 counties and all infestations have been treated in 75 other counties on the northern and western periphery of the infested area. The program is considered to be in the "mop-up" stage in Arkansas, North Carolina and South Carolina where only small, isolated infestations remain. The above map, prepared by USDA Plant Pest Control Division, ARS, shows relative positions of infested areas.



BOLT FOR FREEDOM—The final bolt was recently put in place to mark completion of 3,000-ton cast iron shaft lining installed in International Minerals & Chemical Corporation's potash mine shaft at Esterhazy, Saskatchewan. In the photo above, the golden bolt is put in place by Thomas M. Ware, left, president of IMC, and T. C. Douglas, Premier of Saskatchewan. This act marked the placing of the last of 17,000 bolts used to assemble the shaft lining installed to wall off a 200-ft. layer of quicksand, called Blairmore, which heretofore had blocked all attempts to develop the potash reserves in the Canadian province. The IMC plant and mine is expected to be in production in 1962.

Wisconsin Nematologist Announces Retirement

MADISON, WIS.—Gerald Thorne, specialist in the study of nematodes, will retire from the University of Wisconsin on July 1, the University College of Agriculture has announced. Mr. Thorne came to Wisconsin in 1956 from a U.S. Department of Agriculture regional office in Salt Lake City, Utah, where he was senior nematologist. He had worked for the federal government for 38 years.

At Wisconsin, Mr. Thorne has been building up a collection of nematodes found in North Central states. The collection will be used in teaching and research for years to come. He has also been teaching in plant nematology with Henry Darling, plant pathologist at Wisconsin. He has conducted research on plant parasitic nematodes, nematodes associated with insects, free-living nematodes, and nematodes that are predators on other nematodes.

Mr. Thorne has recently completed the manuscript for a major new book in nematology which will be printed this fall.

He has been a prolific writer, producing some 70 technical papers on the taxonomy of nematodes.

New Dean of Agriculture Named at Rutgers U

NEW BRUNSWICK, N.J.—Dr. Leland G. Merrill, Jr., 40, has been named dean of the College of Agriculture and director of the Agricultural Experiment Station of the state university, according to an announcement by Dr. Mason W. Gross, president of the university. Dr. Merrill, a research specialist in entomology, holds two advanced degrees from Rutgers. He is a 1942 graduate of Michigan State College, distinguishing himself as an Olympic wrestler and a World War II army officer before beginning his career in entomology.

L. G. Merrill, Jr.

The new dean is chairman of the cooperative extension phase of the college of agriculture's evaluation study, secretary-treasurer of the Eastern Branch of the Entomological Society of America.

He succeeds Dr. William H. Martin, emeritus dean of the college of agriculture, who retired last June.

Plant Goes on Stream

SAN FRANCISCO—The Oronite Division of California Chemical Co., a subsidiary of Standard Oil Co. of California, recently shipped the first order of packaged maleic anhydride from its new plant in Richmond, Cal.

Maleic anhydride is a chemical intermediate employed in the production of agricultural chemicals and in various other industrial applications.

Bemis Earnings Up

ST. LOUIS, MO.—Both sales and earnings of Bemis Bro. Bag Co. for the first quarter of 1961 were up 3% over the same period a year ago, the company has reported. Consolidated sales of Bemis and its subsidiary companies for the three months ended March 31 were $33,471,347, as compared with $32,419,792 a year ago, and net income was $748,603, as compared with $724,749.

TO INCREASE PYRETHRUM PRODUCTION IN KENYA

LONDON—Plans for increasing pyrethrum production in the Kenya colony of Africa to more than 14,000 tons have been announced by Norman Hardy, executive officer of the Kenya Pyrethrum Board and administrator of the African Pyrethrum Technical Information Centre, Ltd. The increase would make the value of the pyrethrum output some $15.4 million.

Mr. Hardy said that an all-out effort is being made to increase sales of pyrethrum in many countries of the world, including the Soviet Union. He reported that more than 20,000 African families and 1,050 European farmers are presently producing pyrethrum in Kenya, and added that the pyrethrum market contributes a stabilizing influence in Africa's uncertain economy.

TODAY'S MOST WIDELY

IMITATED

INSECTICIDE SOLVENT

ESPESOL 5

SIGNAL OIL AND GAS COMPANY — ESPESOL — PRODUCTS

SIGNAL OIL AND GAS COMPANY
HOUSTON DIVISION

CALL OR WRITE FOR COMPLETE INFORMATION ON ESPESOL 5

U. S. Terminals:
Houston, Texas; Chicago, Illinois; East Liverpool, Ohio; Madison, Indiana; Brownsville, Texas; Savannah, Georgia; Carteret, New Jersey; Los Angeles, California; Richmond, California

European Terminals:
Dordrecht (Rotterdam) Netherlands • Livorno (Leghorn), Italy

Post Office Box 5008—Houston 12, Texas—Phone WAlnut 3 1651

New York Office: 10 Rockefeller Plaza, New York, Phone Circle 7 2520
Chicago Office: 1515 N. Harlem, Oak Park, Illinois, Phone VI (lage 8-5410
Cleveland Office: 20800 Center Ridge Rd., Cleveland, Ohio, Phone EDison 3-0188
Louisville Office: 4th and Broadway St., Louisville, Ky., Phone JUniper 3-7634
Atlanta Office: 3121 Maple Drive., N.E., Phone CEdar 3-3227
Long Beach Office: 2828 Junipero Ave., Long Beach, Phone NEvada 6-3301

Many Innovations Noted on 2 Anhydrous Ammonia Barges Put in Service by Phillips

(Photo on page 1)

HOUSTON, TEXAS — Phillips Petroleum Co. has recently taken delivery on two barges, the "Mary Lee" and the "Marjorie B.," for transportation of anhydrous ammonia and LP-gas. These barges are designed to transport the cargo in a fully refrigerated condition. As far as is known, these are the first large volume refrigerated barges ever constructed.

The barges will begin operation as an integrated tow to transport anhydrous ammonia from Adams Terminal, on the Houston ship channel, to East St. Louis, Ill. They will be loaded with ammonia from four 1,000 ton spheres operating at about 40 psig (plus 26°F.). The cargo will be cooled to atmospheric pressure (minus 28°F.), while in transit, by a direct refrigeration system. At East St. Louis, the barges will be unloaded into two 15,000 ton cone roof storage tanks which are designed to operate at atmospheric pressure (minus 28° F.). The size of the tow can be increased in the future by adding a box type barge between the present barges. The barges have been certified by the U.S. Coast Guard and classified by the American Bureau of Shipping.

The barges are of open hopper type construction with two horizontal cylindrical cargo tanks in each barge. Each barge has a capacity of approximately 1,830 tons ammonia. The lead barge measures 305 ft. x 44 ft. x 12 ft. 6 in. The trail barge measures 284 ft. x 44 ft. x 12 ft. 6 in.

The tanks are approximately 16 ft. in diameter and approximately 242 ft. in over-all length. They were constructed of a special carbon steel having ductility at the low operating temperature. The welds were required to pass the same low temperature ductility tests as the parent metal. The tanks will operate at a maximum of 40 psig. It was necessary to design the tanks for 65 psig to meet the U.S. Coast Guard requirement of a design pressure of 25 psi above the maximum operating pressure.

The direct refrigeration system on each barge operates by drawing vapors from the top of the cargo tanks, compressing and condensing the vapors and returning the liquid to the cargo tanks. Sufficient refrigeration is installed on each barge to handle the heat gained through the insulation, as well as to reduce the cargo temperature from a plus 26°F. to a minus 28°F. in six days. The cargo can then be unloaded directly into the receiving storage without further cooling.

Refrigeration capacity on each barge is in two equal sized units either of which is more than enough to maintain the cargo below the tank operating pressure, thus meeting the U.S. Coast Guard requirement for stand - by refrigeration equipment. The refrigeration compressors are belt-driven from diesel engines. These engines also drive the pumps for supplying cooling water to the condensing units. The compressors are controlled by cargo tank pressure.

Failure of both compressors would not be a cause for alarm because of the time required for the barge cargo temperature to increase sufficiently to open the relief valves. With no refrigeration, it would take over three weeks for the cargo to warm up from the loading temperature sufficiently to pop the relief valves. After the cargo has been cooled to a minus 28°F. (atmospheric pressure), it would take over two months for the cargo to warm up sufficiently to pop the relief valves, engineers state.

During transit, the liquid level in the tanks will drop as the cargo temperature is reduced. Equal liquid level is maintained in each tank by a system which will return the condensed vapor from the refrigeration equipment to the tank with the lowest liquid level, if the tanks are unequal, or return approximately equal volumes to each tank, if the liquid levels are equal.

As the barges were designed for carrying LP-gas as well as anhydrous ammonia, U.S. Coast Guard regulations made it necessary that all connections be on the tank top. This eliminated the possibility of piping directly from the tank bottoms to the unloading pumps. Unloading is accomplished by using the refrigeration compressors for moving the ammonia from the cargo tanks to a small elevated separator. From this separator the cargo is pumped by diesel driven vertical centrifugal pumps to shore storage.

The tanks are insulated by approximately 4 in. of a U.S. Coast Guard approved insulation. This insulation is covered by glass fabric, a weatherproof mastic and by a sheet metal protective cover for mechanical protection near the refrigeration equipment and pumps, as well as around the piping connections. Tank outlets are equipped with hydraulically-operated emergency valves.

Ammonia is loaded through approximately 5,700 ft. of 6 in. and 8 in. loading line to the barges at a rate of approximately 1,100 gpm. The energy input to the cargo by the loading pump on shore will cause a temperature rise of about 1½°F. The temperature rise due to heat gain in the loading line can be as much as 7°F. These temperature increases, when added to the storage temperature of 26°F., result in an ammonia temperature of as much as 34½°F. at the loading dock.

To preclude the possibility of overpressuring the cargo tanks during the loading operation, each barge is equipped with a pressure reducing valve on the fill line to limit the pressure in the tanks to 40 psig. Considerable vapor flashes across these pressure reducing valves. The refrigeration equipment on the barges has sufficient capacity to condense this vapor, as well as the vapor boiled off due to heat gain through the insulation and the vapor displaced by the incoming liquid.

Heat gains as the ammonia is unloaded at the receiving terminal through approximately 7,800 ft. of insulated line (mostly 8 in.) are handled by the shore storage refrigeration equipment.

CUT
PROCESSING
COSTS

Automatic Thayer Scale Controls 3 Ingredients in Cranberry Sauce Processing, Cuts Handling Costs and Increases Profits.

Costly, time consuming measuring, feeding and blending operations in the making of cranberry sauce have been mechanized with 1 Thayer Scale. Now a Thayer Metering Scale continuously feeds cranberries, at precise rates, to the cooking process. In addition, the scale automatically controls the 2 other ingredients required, resulting in better product quality and uniformity at lower handling costs.

Unlike conventional scales, the Thayer Scale has no knife edge pivots to wear and cause inaccurate weighing. The Flexure-Plate suspension system of the Thayer Scale cannot wear, requires no maintenance, and accuracy is guaranteed for millions of weighings.

Thayer engineers will inspect your product and production process and demonstrate how your costs can be reduced by more accurate weight control.

Write for information on BAGGING, BATCHING, METERING and CHECKWEIGHING SCALES.

THE Thayer SCALE

THAYER SCALE CORP.
3 Thayer Park
Pembroke, Massachusetts
TAylor 6-2371
A Subsidiary of Sundstrand Corporation

SALES RESPONSIBILITY CHANGED FOR ESCAMBIA

ATLANTA, GA.—Ashcraft-Wilkinson Co. and Escambia Chemical Corp. have jointly announced that effective July 1, 1961, Escambia will assume responsibility for the sale of its nitrogen products manufactured at Pace, Fla.

Ashcraft-Wilkinson, who has been exclusive sales agent for Escambia in both the fertilizer and industrial markets, will continue to represent Escambia during the current fertilizer season as its exclusive sales agent, and will render any assistance possible to Escambia and customers of Escambia's nitrogen products during the transition period.

The association between Ashcraft-Wilkinson and Escambia has been in existence since Escambia was founded in 1955.

Escambia's nitrogen sales and technical service organization will be headquartered in Atlanta, with sales representatives located in the Southeast marketing area served by its plant. This change will bring the responsibility for the sale of all of Escambia's products directly under the supervision of Escambia's sales department.

Ashcraft-Wilkinson will continue to serve the fertilizer industry as a supplier of a wide range of fertilizer materials.

Egyptian Entomologist Waits a Long Time to Greet Professor He Admires

CAIRO, EGYPT—Abdel Aziz Fathy, top entomologist of Egypt, was inspired to enter this profession years ago, at least partly through the influence of an American professor under whom Mr. Fathy had hoped to study. The professor is Dr. Harold H. Shepard who was at the University of Minnesota at the time the Egyptian was making up his mind to come to America to study.

As things turned out, however, Dr. Shepard left the university in 1943 to take up duties with the War Food Administration in Washington, and Mr. Fathy thus missed getting to study under Dr. Shepard's instruction. So the two had never met . . . that is, until recently in Cairo during the International Agricultural Exhibition which ended April 30.

Dr. Shepard, still with the U.S. Department of Agriculture as a coordinator of USDA defense activities, was in charge of the agricultural chemicals research display in Cairo. There, at last, Dr. Fathy shook his hand.

Dr. Fathy, now director general of the Crop Protection Department in the Egyptian Ministry of Agriculture, came to America after reading Dr. Shepard's book—"The Chemistry and Toxicology of Insects"—and earned M.S. and Ph.D. degrees in entomology at the University of Minnesota. Dr. Shepard's book, published in 1939, was an accepted world authority on insecticides.

Soon after the meeting at the display, Dr. Shepard conducted a seminar on "chemicals in agriculture." Dr. Fathy was finally listening to a lecture by the man he had wanted to study under nearly 20 years ago! He had brought his whole staff along.

Following the seminar, Dr. Fathy invited Dr. Shepard to visit his department and advise him and members of his staff on the adaptation of their research to Egyptian conditions without duplicating work done elsewhere.

Dr. Fathy's department is studying the behavior of insects and testing pesticides new to Egypt. "Real imagination is being used in this research," Dr. Shepard commented.

He also exchanged visits with another University of Minnesota alumnus, Dr. Zeid, head of the pesticides department, University of Alexandria. Dr. Zeid's laboratory develops specifications and conducts tests for quality control for imported pesticides.

Dr. Shepard, with 34 years of experience, teaching, regulatory and administrative work with pesticides, was among 50 American scientists and technicians who helped tell the story of American agriculture at the fair through exhibits, demonstrations, and seminars. He was to return to Washington on May 11.

The entomologist is editor of a two-volume work, "Methods of Testing Chemicals on Insects," published in 1958 and 1960. He presented copies to the Egyptian Ministry of Agriculture.

Dr. Shepard also worked on revised editions of Henry T. Fernald's "Applied Entomology," which since 1921 has been a basic college text in entomology. He received the Department of Agriculture's Superior Service Award in 1960.

WESTERN COMMITTEE—The Western Industry Advisory Committee of the National Plant Food Institute met in San Francisco recently to discuss the 1961-62 program and budget for the West and Pacific Northwest. Projects of greatest interest were intensified soil fertility, dealer workshops and soil moisture-fertility relationships. From left to right around the table are: William W. Clines, American Potash & Chemical Corp.; Dr. M. H. McVickar, California Chemical Co.; Les Hamilton, California Chemical Co.; Harold Ferguson, Balfour-Guthrie & Co., Ltd.; Charles Bourg, U.S. Steel Corp.; R. H. McGough, Collier Carbon & Chemical Corp.; Elwood Lentz, chairman, Western Phosphates, Inc.; Lawrence Roberts, Shell Chemical Co.; William F. Price, Swift & Co.; John Hall, Potash Company of America; Ed Kitchen, U.S. Borax & Chemical Corp., and Raoul Allstetter, National Plant Food Institute.

Olin's Sales Decline in First Quarter of 1961

NEW YORK—Sales of Olin Mathieson Chemical Corp. in the first quarter of 1961 were $159,959,000, 1.9% less than the record high of $163,132,000 in the initial quarter of 1960. Net profits were $5,115,000 or 38¢ per share, compared with $8,567,000 or 64¢ per share a year ago.

While profits improved during March, the increase was not sufficient to offset the lower levels of the first two months, Thomas S. Nichols, chairman, reported. Announcing the company's results for the quarter at the recent annual shareholders' meeting, he attributed the decline in profits to the continuing cost-price squeeze.

Swift Creates New Chemical Sales Post

CHICAGO — James E. Elder will become industrial chemical sales manager of Swift & Co. June 5, it has been announced by W. F. Price, general manager of the company's agricultural chemical division. The new post was created to provide improved customer service in the company's expanding industrial chemical business, Mr. Price said.

James E. Elder

Mr. Elder started his Swift career in the Atlanta plant food division in 1934. From 1936 until 1956 he held various sales, operational and managerial positions in the company's plant food division in Atlanta, Houston, New Orleans, Chicago and Albany, Ga. He was then assigned to the president's staff in Chicago for further management training. In 1957 he was named manager of the Swift meat packing plant at Ocala, Fla., and since 1959 has managed the Swift meat plant at Montgomery, Ala.

The new industrial chemical sales manager is a graduate of Fulton High School in Atlanta. He also attended the Georgia Institute of Technology.

Made Vice President

WILMINGTON, DEL. — Dr. John H. Long was recently elected a vice president and member of the executive committee of Hercules Powder Co. Dr. Long has been general manager of the company's paper makers chemical department since June, 1956, and a member of the company's board of directors since December, 1958.

New Canadian Directory Covers Chemical Industry

OTTAWA, ONT. — The Dominion Bureau of Statistics released its 1960 edition of the Chemical Directory of Canada. Seventh of a series, previous issues were published in 1919, 1921, 1933, 1938, 1950, and 1954. The present volume brings the information up to date in order to meet frequent requests that come to the bureau for complete lists of producers of chemicals and chemical products manufactured in Canada.

In preparing this directory, the definition of the chemical industries has been broadly interpreted to include not only the manufacturers of chemicals but also the makers of allied products, such as paints, soaps, etc., and the closely related process industries, such as petroleum refining, paper making, etc. In 1958, about 1,714 plants operated in these industries and production totalled about $6 291 million.

New Headquarters for U.S. Borax & Chemical

LOS ANGELES, CAL. — United States Borax & Chemical Corp. has negotiated a long-term lease agreement with the Carter Company providing for the construction of a new U.S. Borax headquarters building in Los Angeles, it is announced by Hugo Reimer, president.

Mr. Reimer said the 275,000-sq. ft. office and parking structure, to be located on the northwest corner of Wilshire Blvd. and Westmoreland Ave., will be ready for occupancy early in 1963. U.S. Borax will lease the nine-story building for an initial term of 30 years with options to extend the lease for two additional 10-year periods.

TGS Elects Director

HOUSTON—Election of E. F. VanderStucken, Jr., as a director of Texas Gulf Sulphur Co. was announced by Claude O. Stephens, president, at the recent annual meeting of stockholders here.

E. F. VanderStucken

Mr. VanderStucken resigned as vice president and secretary of Texas Gulf in January, 1961. He joined the company in 1936 and served as secretary from 1955 and vice president from 1957. He has been retained by the company as a consulting attorney.

California Reports Slight Decline in Earnings of Chemical Plant Employees

SAN FRANCISCO — Production workers in California's agricultural chemicals industry earned less in March, 1961 than in the previous month or in the same month a year ago.

The latest figures of the California Department of Industrial Relations show that agricultural chemical workers averaged $103 in March, compared with $109 in February and $106 in March of 1960. Both average hourly earnings and average work week declined between February and March.

Workers were earning $2.55 and working 43 hours in February, compared with $2.52 and 41 hours in March. The average hourly wage was only $2.41 in March of 1960, but agricultural chemical workers were on a 44-hour week.

In the California chemical industry as a whole, average weekly wages rose between February and March, from $110 to $113. The work force in the state's chemical industry rose slightly, from 39,300 workers in February to 39,500 in March. There were 39,200 employed in chemicals last March.

DIVIDEND DECLARED

NEW YORK—The board of directors of American Potash & Chemical Corp. on April 25 declared a quarterly dividend of 30¢ a share on the common stock, $1 a share on the $4 Cumulative Preferred Stock, Series A, and $1.25 a share on the Special Preferred Stock. The dividends are payable June 15 to stockholders of record June 1, 1961.

PLANT INJURY

BUTLER, IND.—Maynard Sawvel, plant employee for Federal Fertilizer Sales Corp. here, suffered a crushed right hand in a recent accident involving a tractor in the plant. The hand was later amputated in a hospital. According to reports, the tractor backed off a ramp and overturned, catching Mr. Sawvel beneath it. He had worked at the plant only a brief time before the accident occurred.

Representative Named For Texas Manufacturer

SAN ANTONIO, TEXAS—Richard E. Brown has been named a representative for the Green Light Co., San Antonio, according to an announcement by B. J. Hardy, general manager of the company. Mr. Brown will cover the Rio Grande Valley, Corpus Christi and San Antonio for the company which manufactures insecticides and plant food products. Its marketing area comprises eleven southern and western states.

Richard E. Brown

Mr. Brown attended Tulane University and completed a sales training program in agricultural lines in California.

PROFITS GROW BEST
WITH LIQUID FERTILIZER

Liquid fertilizers are booming. In the past two years alone, manufacturing plants have doubled and retailers report sales as high as 100 tons of liquid to every ton of dry!

When you sell liquid fertilizers you offer the farmers in your area greater speed, uniformity, and accuracy of application, lower cost of application per acre, and increased flexibility of application.

Nine chances out of ten your customer will look to you for custom application, too . . . adding further profits on almost every sale.

Get your share of this growing business by offering your customers a complete one-stop fertilizer source. We can furnish you with all the equipment you need, help you establish sources of supply, work with you to get your liquid fertilizer business started.

No matter what size operation you plan, Tryco can serve you with a more complete line of equipment and supplies than any other company. You'll find Tryco the ideal one-stop source for every need . . . from storage tanks or nurse tanks to transfer pumps, fibreglass tanks, hose, and nozzles.

Let us show you, too, how economical Tryco applicators and complete line of liquid fertilizer equipment can help you make the most of the profit opportunities right in your own area. A letter or a phone call will bring you complete information . . . without obligation, of course.

Tryco

TRYCO MANUFACTURING COMPANY, INC.
1160 SOUTH MONROE STREET • DECATUR, ILLINOIS
P.O. BOX 1277 • PHONE 428-4666

Croplife®

A BUSINESS PAPER FOR THE FARM CHEMICAL INDUSTRY

"Easy Growth" Period for Chemical Trade May Be Over But More Progress Is Ahead

REPORTS FROM numerous manufacturing firms in the fertilizer and pesticide fields tell an increasingly familiar story: "Sales increased, but net income failed to keep pace." In some cases, net income not only failed to keep pace, but actually fell behind.

This situation obviously calls for some soul-searching and some re-appraisal of the industry's future production and marketing plans. And this is what many in the field are doing. The subject was given a good look at the recent meeting of the American Institute of Chemical Engineers when the problem was thoroughly discussed.

One speaker, George W. Blum, Goodyear Tire & Rubber Co., said that a sharp rise in production will be necessary if a given company is to maintain its competitive position in 1965 and 1975. He reiterated the idea that earnings of late have fallen below the average of preceding years.

"In order to maintain its present competitive position in the industry, a company will be required to produce about 40% more in 1965 than it did in 1955; and by 1975 must produce 100% more than in 1955, with only about 10% more hours worked.

"In 1955," Mr. Blum declared, "every American at work supported himself and one and one-half other people. In 1975, each working American will have to produce sufficiently to support himself and three and one-half other people in order to maintain the standard of living expected to exist in 1975."

Although he was referring to the chemical industry as a whole, there can be no doubt about his predictions applying directly to that portion of the trade devoted to making chemical products for the farm . . . fertilizers and pesticides.

Further enlightenment to chemical manufacturers was presented in a talk by James B. Weaver, Atlas Powder Co., who reported that more and more companies in the field believe the period of easy growth is passing, and that a new look needs to be given to methods of evaluating return on investment.

"Although the concept of return on investment is reasonably accepted in the chemical industry, there is much less agreement on the methods of calculation of return on investment," he said. "Those who first saw the importance of the general concept of return on investment, initiated within their companies fairly simple relationships as calculating procedures. Such companies have been eminently successful, using these simple measures such as return on original investment."

The speaker then pointed out that other companies have been converting to techniques which will consider more of the essential variables in comparison of alternatives required in every capital expenditure evaluation. "Perhaps this results from a desire to do still better than their already successful competitors," Mr. Weaver suggested. "But it is more likely that managements of these companies see clearly that the period of easy growth in the chemical industry may be behind us."

The trick is to avoid omission of significant variables in arriving at actual manufacturing and marketing costs. Severe competition has brought about a new emphasis on cost and profitability estimations of all types.

Perhaps the years of "easy growth" are passing, but not the years of growth itself. As the industry continues to reach maturity, its leaders cannot escape the conclusion that to build solidly for the future, realistic means must be used to calculate costs . . . ALL costs, as a basis of determining where we have been, where we are, and in what direction the industry is going.

Farm Progress Means Sales

KEEPING UP with changes in American agriculture is one of the challenges faced by firms making and selling chemical products to farmers. Everyone knows that the entire picture is changing . . . not only from the influence of government programs, but from technological causes as well.

One of the most noteworthy presentations pointing up such changes was made recently at the Farm Marketing Seminar, by Successful Farming magazine. The challenge thrown out to people selling to farmers was that they must recognize agricultural changes, and not use "yesterday's approach" to marketing any more than the farmer would apply outmoded methods to his own operations.

Many of the points made in the presentation are significant to marketing people in both fertilizer and pesticide areas. Agriculture is a dynamic industry, America's largest, the presentation said. Despite decreases in the number of farms, there are still 20 times as many farms in the U.S. as there are other manufacturing establishments. And the farmer maintains his distinction as the biggest single customer, spending some $39 billion a year. Though they may be fewer in number, the remaining farmers are heavy buyers.

Increased productivity is back of this situation, Successful Farming pointed out, and this in turn is due to mechanization, chemicalization, and management. All work together to step up the output per man.

The mechanical revolution has been under way for a century but, in only two decades, chemicals have increased farm output almost as much as the mechanical revolution has done in 100 years. Such speedy progress continues to exert great influence in the agricultural picture, and broad acceptance of these chemical products has wrought vast changes. Between 1954 and 1959, for instance, fertilizers were applied on 8% more acres on 19% fewer farms; and the output of farm produce reflects this stepped-up effort. It is evident that the tools the farmer needs for survival in the highly competitive 1960's are available. But he must be constantly encouraged to use them, and also taught how to employ them effectively. The modern farmer is more of a business man than were many of his predecessors, and as a good manager will spend more time seated at his desk rather than on his tractor seat.

The good manager realizes that he must increase volume to increase profits. So he figures more closely. He realizes that in 1940, he spent 46¢ of each dollar received, for purchased inputs; in 1950, it was 57¢; and in 1959, 63¢. All this adds up to the farmer being a bigger customer of industry, spending some $25 billion for production goods in 1959.

Agriculture is in transition, and farmers' attitudes are changing. They are becoming increasingly profit-oriented, regarding their vocation first as a business, and second as a way of life. They consider management skills as important as production ability . . . and by this token, should be more susceptible to technical guidance offered them by the makers of pesticides and fertilizers.

Croplife's Home Office

Croplife®

BPA — *Member of Business Publications Audit*

NBP — *Member of National Business Publications*

Lawrence A. Long, Editor
Donald Neth, Managing Editor

John Cipperly, Washington Correspondent

ADVERTISING STAFF — Wayne M. Soule, Advertising Sales Manager; Carl R. Vetter, Advertising Department Manager; Bruce A. Kirkpatrick, Advertising Production Manager; Jerome C. Whiting, Assistant Advertising Production Manager; R. Dale Swenson, Promotion Manager; James S. Barden, Marketing and Research Director.

BUSINESS STAFF—Milton B. Kihlstrum, President; Wilfred E. Lingren, Executive Vice President; Don E. Rogers, Vice President; Paul L. Dittemore, Vice President; Donald Neth, Secretary; Norman Couper, Treasurer and Controller; James G. Pattridge, Assistant Treasurer; Harry M. Dunn, Jr., Circulation Fulfillment Manager; Richard Ostlund, Office Manager; Walter O. Buchkosky, Production Superintendent.

ADVERTISING REPRESENTATIVES

EASTERN STATES—Paul L. Dittemore, Manager; Archy S. Booker, Jr., and James W. Miller, Advertising Sales Representatives; Room 1101, 52 Vanderbilt Ave., New York 17, N.Y. (Tel. Oregon 9-2490).

CENTRAL STATES—Don E. Rogers, Manager; Amos W. Standish and Robert M. Harrison, Advertising Sales Representatives; 2832 Board of Trade Bldg., 141 W. Jackson Blvd., Chicago 4, Ill. (Tel. Harrison 7-0515).

SOUTHWEST—Martin E. Newell, Manager; Thomas E. Letch, Assistant Manager; 612 Board of Trade Bldg., Kansas City 5, Mo. (Tel. Victor 2-1350).

NORTHWEST—Wayne M. Soule and Paul A. Anderson, Advertising Sales Representatives, P.O. Box 67, Minneapolis 40, Minn. (Tel. Franklin 4-5200).

WASHINGTON CORRESPONDENT — John Cipperly, 604 Hibbs Bldg., Washington, D. C. (Tel. Republic 7-8534).

WESTERN STATES — The Maurice A. Kimball Co., Inc., 2550 Beverly Blvd., Los Angeles 57, Cal. (Tel. Dunkirk 8-6178); The Maurice A. Kimball Co., Inc., 681 Market St., San Francisco 5, Cal. (Tel. Exbrook 2-3365).

EXECUTIVE AND EDITORIAL OFFICES — 2501 Wayzata Blvd., Minneapolis, Minn. Tel. Franklin 4-5200. Bell System Teletype Service at Minneapolis (MP 179), Kansas City (KC 295), Chicago (CG 340), New York (NY 1-2452), Washington, D.C. (WA 82).

Published by

THE MILLER PUBLISHING CO.

2501 Wayzata Blvd., Minneapolis, Minn.

(Address Mail to P. O. Box 67, Minneapolis 40, Minn.)

Associated Publications—The Northwestern Miller, Farm Store Merchandising, Feedstuffs, Feedlot, Professional Nursing Home

May 29 — Crops-Soils Field Day, Michigan State University, East Lansing, Mich.

June 5-7—Association of Southern Feed, Fertilizer and Pesticide Control Officials, Lafayette Hotel, Lexington, Ky.

June 6-7—Georgia Plant Food Society, summer meeting, Wanderer Motel, Jekyll Island, Ga.

June 11-14—National Plant Food Institute, annual meeting, The Greenbrier Hotel, White Sulphur Springs, W.Va.

June 18-21—Northeast Regional Branch, American Society of Agronomy, joint meeting with Eastern Section, Canadian Societies of Agronomy and Soil Science, University of Vermont, Burlington, Vt.

June 19-22—Western Societies of Soil Science and Crop Science with Pacific Division, American Association for the Advancement of Science, University of California, Davis, Cal.

June 27-29—Twelfth Annual Fertilizer Conference of the Pacific Northwest, Marion Hotel, Salem, Ore. Chairman: B. R. Bertramson, agronomist, Washington State University, Pullman.

June 20—Illinois Crop Improvement Assn. annual meeting and conference. Urbana-Lincoln Motor Inn, Urbana, Ill.

June 20-22—Pacific Branch, Entomological Society of America, Miramar Hotel, Santa Barbara, Cal.

June 27—American Society of Agricultural Engineers, 54th annual summer meeting, Iowa State University Armory, Ames, Iowa.

July 5-7—American Society of Agronomy, Midwest branch meeting, University of Wisconsin, Madison.

July 11-12—Empire State Soil Fertility Assn., annual meeting; Hamilton College, Clinton, N.Y.

July 16-17—Plant Food Institute of Virginia and North Carolina, annual meeting, Asheville, N.C.

July 18-19—Annual Summer Fertilizer Conference, sponsored by Auburn University and Alabama Soil Fertility Society, Auburn University campus, Auburn, Ala.

July 19-21—Southwest Fertilizer Conference and Grade Hearing, Galvez Hotel, Galveston, Texas.

Aug. 10-11—Mississippi Soil Fertility and Plant Food Council, annual meeting, Biloxi, Miss.

Aug. 16-20—Canadian Fertilizer Assn. annual convention, Manoir Richelieu, Murray Bay, Quebec. R. P. Pennington, 2 Carlton St., Toronto 2, Ont., secretary-treasurer.

Aug. 27-30—Annual meeting of American Society for Horticultural Science, Purdue University, Lafayette, Ind.

Sept. 10-13—Farm Equipment Institute, 68th annual convention, Palmer House, Chicago.

Oct. 4 - 6 — Southeastern Fertilizer Conference, Atlanta Biltmore Hotel, Atlanta, Ga.

Oct. 9-11—Western Agricultural Chemicals Assn., annual meeting, Hotel Claremont, Berkeley, Cal.

Oct. 12-13 — Northeastern Fertilizer Conference, Schine Inn, Chicopee, Mass.

Oct. 29-Nov. 1—National Agricultural Chemicals Assn., 28th annual meeting, Homestead Hotel, Hot Springs, Va.

Nov. 2-3 — Pacific Northwest Plant Food Assn. annual convention, Hotel Gearhart, Gearhart, Oregon.

Nov. 7-10—Packaging Machinery Manufacturers' Institute Show of 1961, Cobo Hall, Detroit, Mich.

Nov. 12-14 — California Fertilizer Assn., thirty-eighth annual convention; Jack Tar Hotel, San Francisco.

Nov. 27-30—Entomological Society of America, annual meeting, Miami, Fla.

Nov. 27-30—American Society of Agronomy annual meeting, with Soil Science and Crop Science Societies included, Sheraton-Jefferson Hotel, St. Louis, Mo.

1962

Jan. 17-19, 1962 — Southern Weed Conference, Hotel Patten, Chattanooga, Tenn.; Dr. R. E. Frans, Dept. of Agronomy, University of Arkansas, Fayetteville, secretary-treasurer.

Jan. 18-19—Southern Farm Forum, 15th annual meeting, Roosevelt Hotel, New Orleans, La.

INDEX OF ADVERTISERS

The index of advertisers is provided as a service to readers and advertisers. The publisher does not assume any liability for errors or omissions.

Allied Chemical Corp., Nitrogen Div....25-28
American Cyanamid Co. 39
American Potash & Chemical Corp. 41
Ashcraft-Wilkinson Co. 43, 44, 51
Barnard & Leas Mfg. Co., Inc. 46
Calhoun Mfg. Co. 36
California Chemical Co. 17
Chantland Mfg. Co. 32
Chase Bag Co. 9
College Science Publishers 42
Continental Sales Co. 32
Commercial Solvents Corp. 7
Duval Sulphur & Potash Co. 43, 44, 51
Ehrsam, J. B., & Sons Mfg. Co., The..... 14
Esso Standard Oil Co. 30
Gates Rubber Co. 24
Hercules Powder Co. 37
Hough, Frank G., Co. 45
International Minerals & Chemical Corp. 12, 13, 20, 21
Magnet Cove Barium Corp. 35
Molded Fiberglass Body Co. 40
Penick, S. B., & Co. 6
Potash Company of America 52
Power Curve Conveyor 44
Reasor-Hill Corp. 51
St. Regis Paper Co. 3
Signal Oil & Gas Co. 47
Simonsen Mfg. Co. 38
Sohio Chemical Co. 34
Southwest Potash Corp. 31
Spraying Systems Co. 42
Swift & Co. 10
Tennessee Corp. 11
Texaco, Inc. 33
Thayer Scale Corp. 48
Tryco Mfg. Co. 49
Tyler Mfg. Co. 29
U. S. Borax & Chem. Corp. 19
U. S. Phosphoric Products Division 4, 5
Velsicol Chemical 15

JUST SAY DUVAL THAT'S ALL
Muriate of Potash • Sulphur
DUVAL SULPHUR & POTASH COMPANY
Exclusive Sales Agent: ASHCRAFT-WILKINSON CO.

Grace Executive Dies

MEMPHIS, TENN. — Edward H. LaFleur, industrial relations manager of the nitrogen products division of W. R. Grace & Co., died unexpectedly April 14, his 56th birthday. He was playing golf when stricken.

Mr. LaFleur joined Davison Chemical Co., now a division of Grace, some 26 years ago. He was transferred from Baltimore to Memphis in 1954 and was appointed to his last position two years later.

BRUSH AND WEED KILLERS

KILL BRUSH at low cost with amazing **R-H BRUSH RHAP.** Will not injure grasses, grains; non-poisonous. For free information write Reasor-Hill Corporation, Box 36CL, Jacksonville, Arkansas.

KILL SUBMERSED WATER WEEDS which foul up motor propellors, tangle fishing gear, with **R-H WEED RHAP-20.** Granular 2,4-D. Inexpensive, easy to use, sure results. For free information write Reasor-Hill Corporation, Box 36CL, Jacksonville, Arkansas.

MR. CORN FARMER: Control broad leaved weeds and grasses (crab grass, fox tails) with **R-H WEED RHAP-20.** Granular 2,4-D. Inexpensive, easy to use, sure results. For free information write Reasor-Hill Corporation, Box 36CL, Jacksonville, Arkansas.

Classified Ads

Classified advertisements accepted until the fifth of each month for that month's issue.

Rates: 20c per word; minimum charge $3.00. Situations wanted, 15c a word; $2.25 minimum. Count six words of signature, whether for direct reply or keyed care this office. If advertisement is keyed, care of this office, 25c per insertion additional charged for forwarding replies. Commercial advertising not accepted in classified advertising department. Display advertising accepted for insertion at minimum rate of $12 per column inch.

All Want Ads cash with order.

HELP WANTED

Sohio Chemical Co.

Agricultural Field Sales Representative

Construction of new plant and expansion of sales territory creates need for additional agricultural sales representative for Nebraska, Minnesota and Iowa. Should have one to three years' experience in sales related to nitrogen solutions, combination ammonia, ammonium nitrate, urea solutions 45 and 46% urea. Please send resume including academic background, work experience and salary requirement to: R. J. Shalk, Employee Relations Division, Sohio Chemical Co., Box 628, Lima, Ohio.

Openings for Chemical Engineers

1. Chemical engineer with 3 to 8 years' experience for project leader assignment on complex fertilizer and chemical pilot-plant development. Ability to evaluate costs, scale up, and design essential.
2. Chemical engineer, 0 to 3 years' experience for pilot-plant operation in developing new fertilizers and chemicals. Thorough knowledge of unit operations desirable.

Send your resume in confidence to:

Dr. Grady Tarbutton, Mgr. of Research
The American Agricultural Chemical Co.
Carteret, New Jersey

HELP WANTED

LARGE CHEMICAL COMPANY SUPPLYing plant foods, pesticides and feed additives needs salesmen with 3-8 years' selling experience in one or more of these areas. B.S. degree in agriculture, chemistry or chemical engineering preferred. Send resumé to W. R. Hayes, Monsanto Chemical Co., Agricultural Chemicals Division, St. Louis 66, Mo.

SITUATIONS WANTED

INDUSTRIAL AGRONOMIST, 36, WITH 12 years' experience in all phases of fertilizer industry, including creating and managing grant-in-aid and fertilizer marketing evaluation programs, plus broad experience as sales manager of mixed fertilizers and sales of basic raw materials, desires position in agricultural chemical field in sales management or agronomic work. Resumé upon request. Address Ad No. 6866, Croplife, Minneapolis 40, Minn.

MACHINERY FOR SALE

BAG CLOSING SEWING MACHINES

Specializing in repairing and overhauling Fischbeins, Union Special and Minneapolis machines. Complete line of machines, conveyors, parts, thread and oil for sale. All repairs guaranteed.

PArkview 2-4087

ROBERT E. MAYSE CO.

620 W. Victoria Ave., Montebello, Cal.

Croplife *Want Ads... Get Results*

BUSINESS OPPORTUNITIES

PLANT FOR SALE

CREST CHEMICAL CO.

WATERTOWN, SOUTH DAKOTA

For complete information contact M. A. Sharf, Watertown, S.D. Phone TU 6-6993

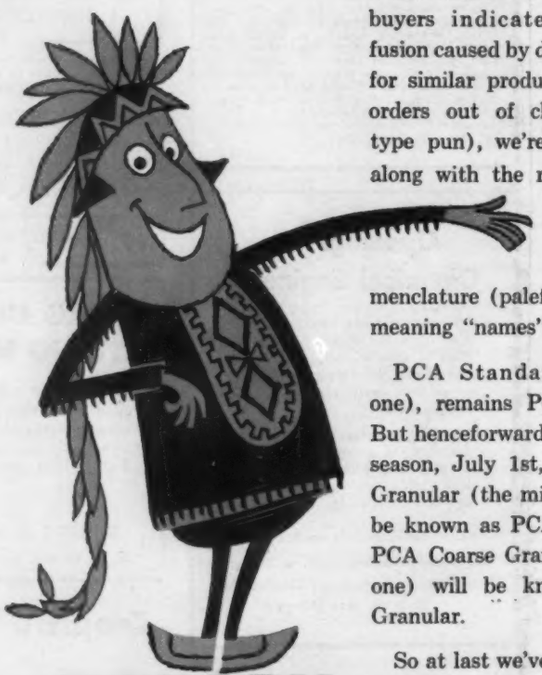
We're name dropping but...

Big Chief Kay-Two-Oh is only trying to impress you with the fact that all sizes of our 60% Muriate of Potash, by ANY name, are the best bet for your manufacturing operations.

At a recent pow-wow, a special committee of the National Plant Food Institute suggested that distress smoke signals from buyers indicate (ugh!) confusion caused by different names for similar products. To bring orders out of chaos (Indian-type pun), we're happy to go along with the rest of the industry in standardizing our nomenclature (paleface-type word meaning "names").

PCA Standard (the little one), remains PCA Standard. But henceforward, as of the new season, July 1st, PCA Special Granular (the middle one) will be known as PCA Coarse, and PCA Coarse Granular (the big one) will be known as PCA Granular.

So at last we've answered the question: What's in a name? Convenience for you in ordering from any source. But for top quality potash, and top service, be sure to order from PCA, top man on the totem pole.



POTASH COMPANY OF AMERICA

CARLSBAD, NEW MEXICO

"America's CHIEF Supplier of Potash"

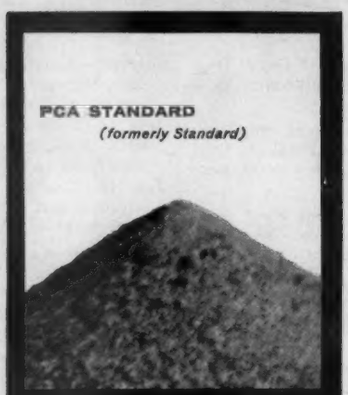
General Sales Office:
630 Fifth Avenue, New York 20

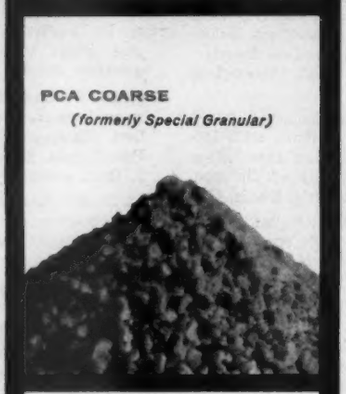
Midwestern Sales Office:
First National Bank Building, Peoria, Ill.

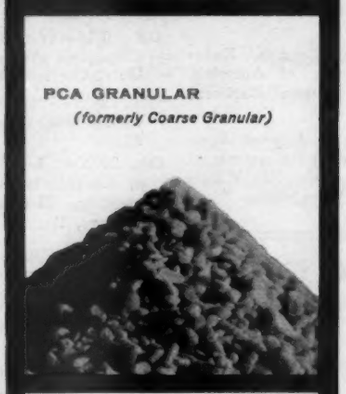
Southern Sales Office:
1776 Peachtree Building, N.E., Atlanta, Ga.

Canadian Sales Office:
2 Carlton Street, Toronto 2, Ontario

Phone, Write, Telex or Wire Our General Offices
In New York:
Phone LT 1-1240, New York
TWX NY 1-5386







P.C.A.
The SALT of the EARTH
RED MURIATE